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SELECTED ECONOMIC TRANSLATIONS

ON EASTERN EUROPE

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INTRODUCTION

This is a serial publication containing selected translations on all categories of economic subjects and on geography. This report contains translations on subjects listed in the table of contents below. The translations are arranged alphabetically by country.

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East Germany CSO: 4859

NEED AND IMPORTANCE OF STANDARDIZATION WITHIN THE SCOPE OF SOCIALIST RATIONALIZATION

/Following is a translation of an article by A. Dudssus, German Chamber of Technology, Deputy Chief Manager, Shipbuilding VVB, Rostock, in the German-language periodical Schiffbautechnik (Shipbuilding Technology), Berlin, Vol. X., No. 9, September 1960, pages 426-432./

Address delivered at the 1960 Spring Shipbuilding Conference "Standardization in Shipbuilding" at Warnemuende.

The spring shipbuilding conferences have always been trend-setters in certain specific fields. In the past, these spring conferences always took up the production technology problems of shipbuilding with the members of the Chamber of Technology; the sessions supplied new impetus for the accomplishment of the major tasks of the shipbuilding industry.

This year's spring shipbuilding conference has the objective of exchanging experience gathered so far in the field of standardization and of setting trends for the further improvement of the standardization effort in this entire industry. Our common efforts must contribute to a further and more rapid increase in labor productivity. The great significance of this labor productivity increase is borne out by the indicators of our Seven-Year Plan. Labor productivity is to be increased 49% by 1965. Standardization plays an important role in this labor productivity increase. The tasks of standardization under socialist production conditions must be so accomplished that all remaining obstacles to the free unfolding of the production forces will be eliminated.

It was found particularly in the field of standardization that capitalist production conditions were no longer in a position to allow the production forces to develop fully. The idea of standardization is blocked by the profit motive of the entrepreneurs and concerns, by business competition, and by the fight for markets. Under capitalist production conditions, standardization thus did not progress beyond the stage of individual company activities. Why have we in the German Democratic Republic been making major changes in our standardization effort since 1959? Why are we so longer confined to the existing DIN /German Industrial Standards/? And why did we set up our own DDR /German Democratic Republic/ standards?

In view of the development of socialist production conditions in the German Democratic Republic, the old kind of intra-company standardization effort -- which was more in the nature of a set of recommendations -- could no longer suffice to guarantee the full development of the production forces.

We are facing the task of raising the standardization effort, which was begun decades ago in Germany, to a higher plane. With all due respect for the work done by the engineers and committees of the DNA /German Standards Office/, we must realize that the tasks of the Seven-Year Plan call for a faster tempo and a mode of operation which will fully meet the requirements of our socialist production conditions. The collaboration of our people-owned enterprises is not encumbered by business competition and rivalry; in an unparalleled fashion, it assures the concentration of all forces on the cooperative improvement of our products and production processes. In the German Democratic Republic, standardization is a government task which is accomplished according to schedule on the basis of rigid deadline plans and in coordination with the tasks of the Seven-Year Plan and the other plans for the development of the national economy.

This means that the shipbuilding industry must concentrate on its points of main effort and devote particular attention to the introduction and implementation of assembly-line production and assembly-line methods; of assembly-line, mechanized production in piping; of the stepped-up introduction of automatic welding; and of the mechanization of transportation and the mechanization of administrative work.

Standardization must exert decisive influence on all problems dealing with the improvement of materiel utilization and materiel consumption. The reduction in waste is particularly important in rolled material. Failure to stay within the waste quotas leads to great difficulties in the production process and is no longer justifiable.

The standardization effort has made good progress in the shipbuilding industry. A nucleus of experienced technicians was always ready when it came to giving their all in an all-German effort in the establishment of DIN standards and in the committees of DNA. Our experts also correctly grasped and tackled the new tasks of standardization in our German Democratic Republic. The positive criticism and evaluation of the shipbuilding industry in Leipzig constitutes further proof of the dash and verve with which this highly important task was accomplished.

In 1950 , the average development time per standard was still 30 months; in 1959, it could be cut to 13 months, and in 1960 it will be only 10 months. The costs of standardization are less than 0.1% of the 1958 gross production of our shipbuilding industry and the full-time members of the standardization bureaus

constitute only 0.18% of the total labor force employed in the shipbuilding industry. Nevertheless, the achievement was tremendous and meant that all employees had to work real hard.

These results are reflected in a 157% plan fulfillment for industry sector standards in 1959. It was correctly realized that many standards offer the real foundation for the rational production of certain structural parts. In 1950, 20 standards were worked out; in 1955, 64 sector standards were established; this year we already have more than 100 sector standards. This constant improvement reflects an improved rational mode of operation and shows that the standardization experts did not lag behind in the effort to increase labor productivity.

Many young people have put their shoulder to the wheel and through their enthusiasm for cooperative work swept others along with them. The entire effort was extended to an increasing group of workers.

The socialist cooperatives are resolutely collaborating in the solution of the principal standardization tasks.

The Shipbuilding Faculty of Rostock University and the representatives of the Economic Science Faculty assisted the shipbuilding industry in many problems. The work of the Chamber of Technology exerted great influence on events in the field of standardization.

Suggestions for standardization from the ranks of the workers greatly contributed to the constant improvement of the effort. Extensive investigations of certain ships as to their degree of standardization revealed many new tasks and also showed that the currently used standard parts amount to about 6% of the ship's weight at this time. In addition to these 6%, we must separately count the share of rolled material, profile steel, insulation, pipes, cables, and other standard parts.

This extensive and difficult analysis was accomplished by the shipyards in a conscientious and thorough fashion and constitutes a good starting point for future work. Several inland shipyards, which so far have not devoted enough attention to the standardization problem, must today gather suggestions and improve their work.

It is particularly gratifying that certain enterprises -- such as Fuerstenberg Shipyard VEB /people-owned enterprise/ -- on their own demand that designs rigidly based on standards be used in cooperative shipbuilding contracts /involving two or more yards/ in order to make for more rational production.

This incipient impatience with the use of outmoded structural elements, which can be produced only individually, must be promoted and must lead to the constantly increased use of standaridized structural parts.

On the basis of the Leipzig Standardization Training Exhibit, the enterprises of the shipbuilding industry formed teams which recognized the need for stepping up the standardization effort.

Deputy Prime Minister Comrade Walter Ulbricht called for the implementation of a radical standardization effort in his trend-setting report.

What do we mean by radical standardization?

1. All-around scientific standardization in the entire national economy.

2. Radical standardization of products and processes. This radical standardization thus includes not only individual structural parts, but entire complexes and standard [ship] types.

3. Great speed in the implementation of standardization.

4. Development of socialist team work in standardization through inclusion of large groups of workers. Here it is especially important to draw all members of the Chamber of Technology into this effort.

5. All the advantages of socialist production conditions must be exploited to the fullest in the standardization effort.

6. Standardization must be the foundation for [shipyard] rebuilding measures. The standardization plans must be coordinated with the content and scope of the Seven-Year Plan and the plan portions entitled "Reconstruction" and "TOW."

7. The standardization tasks of the shipbuilding industry are to be worked out in a long-range plan by 1965 and are to be coordinated with the other industries.

8. Standardization must not be considered as having been completed once the standards have been confirmed. The work of establishing standards fundamentally includes the determination of the over-all requirement for standardized parts and the determination of the economic gain to be derived.

A standardization task is considered completed only when a central producer has been found for the particular structural part.

9. The standards are to be so worked out that their indexes [coefficients] will correspond to world production and products standards or so that they themselves will exert a co-determinant effect on world standards and thus help implement the technical progress of the entire national economy.

10. Obligatory standards must be adhered to under all circumstances. The control over compliance with standards must be organized in a manner involving the largest possible groups of workers.

11. The managers of the production enterprises are responsible for the maintenance of obligatory standards in all stages of production -- from working materials and semifinished items to individual parts and on to the final products.

12. Producer enterprises turning out standard parts must apply the obligatory standards in a consistent manner and participate in the establishment of standards.

13. The teaching of standardization must be promoted and the technical and economic cadres must be so familiarized with the standardization effort that they will be able to develop and implement this standardization activity in leading and medium-level jobs.

These, essentially, are the main viewpoints for the implementation of radical standardization.

Can we in the shipbuilding industry today assert that the goal has been attained?

Are all our employees working as a team on the solution of the standardization problems?

Does everybody really understand that standardization is not and cannot be a sort of parochial job for the standardization bureaus alone?

Have we been able to establish close liaison with the supplier industry in all standardization problems?

Does every engineer, designer, economist, and, last but not least, every production worker realize that standardization is a collective task, a task whose solution will decisively affect enterprise performance and rational production? Does every management official realize that his work will improve and that his difficulties will decrease if he organizes the solution of this common task?

I must say that we have achieved considerable success, but that we have not been able to make a breakthrough in all fields. How else could we explain the fact that not a single engineer was present and that not a single designer made any comments during the discussion of standardization, which was a point on the agenda of the economic conference of the design bureau of the Warnemuende Warnow Shipyard VEB? How could small and medium enterprises advocate the viewpoint that standardization is a secondary problem for them and that they are only suppliers and did not have any influence on the orders as such? This was the case, e.g., at the Waren Foundry.

But the example of the Rechlin Shipyard VEB shows what kind of success can be achieved if the idea of standardization is allowed to strike roots.

In this comparatively small enterprise with about 500 personnel, four men are assigned to standardization on a full-time basis. They correctly realized that an increase in output depends to a very great extent on the degree of products standardization and that plan fulfillment is in turn decisively affected by this. The good performance of the enterprise confirms that the policy it had adopted was correct. Now, you might of

course object that the production program of this shipyard offers good prerequisites for standardization; but did you consider that other shipyards are also turning out ships in series with a large number of parts, that these shipyards have much more of an opportunity for standardization, and that in some cases standardization has not yet progressed beyond the parochial, industry sector stage? We simply cannot go on having enterprises -- like the Stralsund People's Shipyard VEB -- assign only one engineer and four assistants to their standardization section in a program involving a total of 171 medium trawlers.

Despite the Standardization Training Exhibits which greatly stimulated our entire industry, the Stralsund People's Shipyard VEB failed to replace its sick standardization section chief with a full-fledged deputy. This sort of disregard of standardization made it necessary for other shipyards to help out in the People's Shipyard's contracts. For instance, the standardization bureau of the "Neptun" Shipyard VEB, Rostock, had 16 employees and met 56 partial deadlines for sector standards in 1960, whereas the People's Shipyard met only 14 partial deadlines. The Warnow Shipyard drew the correct conclusion; in 1960 it managed to take on an additional 10 standardization jobs and achieved a considerable gain in standardization through correct cadre assignment.

We will not be able to accomplish our tasks if we proceed in this haphazard fashion. The shipbuilding industry learned enough from the Standardization Training Exhibit to enable it to expand the sector standardization plan by 30 projects; it wants to attain the 1965 reconstruction plan targets essentially by 1962; nevertheless, the main thing now is to improve the quality of the standards from the bottom up. The important thing is not only to work out standards, but also to introduce them into practice. The standard is supposed to represent a technological and scientific peak.

Is that always true of our standards?

We can find that many standards no longer are on a level of medium technical maturity; they actually represent the optimum in effectiveness and readiness for series-application, and they can be set up with a minimum of effort.

A number of standards developed directly out of existing plant standards; in this case we only have a consolidation, not a further development. These standards therefore are not aimed at the most rational and economical use of working materials and at a simple and cheap design. In many cases this situation in the past led to the development and use of designs deviating from standards. This was utterly wrong. The best designers must use their most recently acquired knowledge in such a manner that the existing standards can be improved systematically, so that they will fully meet all requirements.

The quality of a standard must be such that the symbol TGL for our extra-enterprise standards will guarantee excellent quality and will be equivalent to a quality guarantee symbol, so that the consumer will meet the TGL-stamped products with full confidence.

This means that 51 current standards in shipbuilding must quickly be revised, and that the establishment of standards must be handled by qualified cadres, for this will be a decisive contribution to our attaining the world standard in our ship.

The standardization sections must not handle this revision on a routine basis; rather, the designers, engineers, economists, and especially the skilled production workers, as well as the producer enterprises with their rich experience, must be used in the revision of the industry sector standards. The revised standards must have maximum structural and technological maturity.

At this time, we have 953 DDR standards which are used in the shipbuilding industry. By 1962, the number of these standards will be increased to about 1,250. Besides, the shipbuilding industry is using 1,500 plant standards.

Last year it was possible to reduce the plant standards from 2,100 to 1,500 through the planned development of sector standards. This great restriction of plant standards was achieved because we completed the kind of standardization measures in 1959 which made many plant standards superfluous. From 1960-1962, a further reduction is to be made in plant standards in favor of sector standards, so that we can eliminate

450 plant standards in 1960,
350 " " " 1961, and
250 " " " 1962.

The target calls for reducing the proportion of plant standards in the DDR and sector standards to 20%.

The curtailment of plant standards will give us more of an opportunity for the centralized production of standard parts in larger numbers of pieces.

The plans, which have been additionally set up by the Shipbuilding Institute and discussed with the enterprises, provide for 75 positions items, of which at least half are to be revised in this light in 1960. This task can be accomplished only if engineering design are drawn into this effort to an increased extent by exhausting all possiblities of socialist cooperative work.

A very important conclusion resulting from standardization work hitherto consists in the fact that, in our standardization work, we must not start from the idea of supplementing existing things, but that standardization is to be fully taken into consideration from the very outset in all new developments, new designs, and F and E jobs /sic/. This means that the designer, the development engineer, and last but not least the technologist must devote most of their attention -- even before the submission of drawings to

the standardization bureau -- to the kind of solution which will contain a maximum of standards; it means further that new developments must from the very beginning be worked out with a view to establishing new standards.

But what actually happened often in the past?

A new product was developed; many, many new details were designed; finally, the structural part was introduced in practice. Difficulties and additional costs were encountered already in the procurement of individual parts, which could have been standardized parts; expensive special production jobs were required. The greatest difficulties and time losses occurred during production and especially during subsequent repairs. Spare parts were hard to get and could not be obtained at all on short notice. Many important elements were not interchangeable. Repair deadlines were not met and million-Mark ships had to be sidelined for unjustifiably long periods.

We must therefore demand that standardization keep pace and move ahead of the development of new products, for this is the only way we can have rational design and this is the only way to give the particular standard a technical peak.

Let us use the possibilities inherent in the application of the system of prefabricated parts and the possibility of exchanging entire complexes.

Let us make sure that we use identical basic elements in aggregates; these elements can later on be used in many different ways, especially with the help of various accessories. Identical motors, identical gears, identical foundations can be put in machines which are used for the most varied purposes. This applies particularly to the supplier enterprises within the shipbuilding industry. Here, the important thing is to use the good experiences and results of other industries, such as the machine tool industry, and to apply them to shipbuilding. Duplication must be avoided through increased exchange of information with the supplier industry in an effort to assure the most rational use of all production possibilities for the solution of the major tasks.

We must cast off all narrow, plant-bound or industry-bound concepts. We must also considerably improve the international exchange of information with the states of the socialist economic system and we must exploit the existing possibilities here much better.

Which standardization tasks must immediately be tackled with all force?

The next step must be taken in the field of complex standardization. Complex not only in the sense of close cooperation of all divisions of the plant, with other industries, and collaboration with the producers of our standard structural parts,

or international cooperation, but also complex in the sense that the development of standards that are limited to certain individual parts is no longer sufficient in the current stage of developments. The important thing is to declare entire complexes as being standard in order, above all, to get assembly-line production and series production in the shipyards.

Complete ventilation installations, sanitary facilities, air-conditioning units, ship structure and machinery sections, if standardized, will facilitate rational production and will save us a considerable number of working hours in the preparation of production and in production itself.

The introduction of such standard complexes offers great possibilities for the further rapid increase in labor productivity.

We will get a reduction in the labor expenditure in all divisions of the plant.

This begins with the filling out of the parts lists in the design bureau. Until now, we had to make separate listings of the many individual parts which are contained in a certain complex, such as a wash basin unit; but now we need only a single entry -- the designation of the standard reference.

The same applies to material procurement, material pickup, and material storage, as well as material bookkeeping. The entire preparation of production is simplified and many unproductive motions are avoided. The old splitting up of production and the many work phases, which are to be accomplished by workers of the most varied qualifications and of the various production sectors, have now been eliminated.

The extensive introduction of standard complexes requires the formation of assembly teams which will do all work connected with the installation of the complex.

Nothing is more natural than the need for a uniform technology in this connection.

The production of complex standards calls for a uniform technology in the form of type technology. But, conversely, we can see even now that production requires the establishment of standard complexes, so that we can use many type technologies to maximum advantage.

Technology will undoubtedly be greatly interested in these problems, in order finally to overcome a state of affairs in which much time is lost due to clerical work; this time must be utilized much more effectively for the development of those technological processes which will assure greater growth in labor productivity.

At this time, it is necessary to work out about 100 new type technologies and to introduce them on an obligatory basis throughout the industry. The development of these type technologies is aimed at standardizing entire technological processes.

The development of the designs is handled in the same manner as in the usual traditional standards by having the particular shipyard call in representatives from other enterprises.

The topics have been so keyed that the shipyard will work out the type technology in a certain field with maximum success. This guarantees that the type technologies will be based on the most rational level in our shipbuilding industry.

This kind of one-time basic work in the establishment of type technologies releases employees for the solution of new problems and gains time for the intensive introduction of the new technique. These are factors which decisively contribute to the considerable increase in labor productivity in the shipbuilding industry.

In the work on the points of main effort, great significance is attached to the cooperation of all plant personnel. The bureau of inventions will stimulate the innovators through concrete proposal of principal tasks and will urge the innovators to participate actively in socialist reconstruction and the rationalization of their plant. This possibility takes into account the initiative of large groups of personnel, so that the basic idea of standardization may become the common property of all workers and will not remain just the parochial, sectional activity of the standardization and design bureaus.

Today we face the absolute necessity of enlivening the idea of standardization with all available means, such as constant indoctrination, popularization, and material incentive.

We expect our joint "Shipbuilding Standardization" Conference to make a major contribution here. It is important for everyone to realize that he is personally involved in these important things, that every individual can and must contribute to this, so that we will achieve the all-around fulfillment of our state plans for the solution of the principal economic task.

The chief benefit from standardization emerges as a result of the production of identical parts in large batches.

And what is the situation here?

Until now, the development of standards was often ended without a determination of the over-all requirements of the shipbuilding industry and without a determination and contractual definition of a central producer for the particular structural part. Thus, of the 953 DDR and sector standards applied, only about 350 were produced centrally in producer enterprises; that means that we must still find producers for 623 standard parts. To be sure, negotiations have been completed with suitable enterprises for 224 standard parts and negotiations have been started for another 399 standard parts; but the fact remains that steps to improve this situation were not taken until last year.

The shipbuilding industry has set itself the goal of assigning to central production, by the end of 1960, all standards worked out in 1959 and most of the new standards set up in 1960; this was done in an effort to give us an orderly system in this field; enterprises now are no longer allowed simply to disregard standards which have

been declared obligatory. In this connection it is also necessary from the very beginning to set up a definite supply system so that the currently existing difficulties connected with repairs and warranty obligations can be kept down to a minimum.

To solve this problem, we must have the organized team work of all enterprises in our shipbuilding dinsutry.

We know that the Fifth Party Congress of the German Socialist Unity Party resolved to develop the supplier industry at an accelerated rate. In the meantime, however, the production output of the final processing industries, such as our shipbuilding industry, has increased at the same or even at a higher rate.

In view of the large amounts of material we use and because 60% of our products are the result of inter-enterprise cooperation, we have not been able to eliminate the existing disproportions to the fullest extent.

The machine-building industry and the industry of the republic as a whole have some major new tasks now, e.g., as a result of the need for increasing the mechanization of agriculture. The requirement for means of production for agriculture alone amounts to 1.3 billion Marks and must be covered on a priority basis. This means that we must find new ways of utilizing all advantages arising from centralized production of standard parts in the interest of increasing the labor productivity also in connection with production in the shipyards.

For those standards parts, for which we cannot find central producers in the supplier industry, we will therefore have to organize our own centralized production setup within our own shipbuilding industry. Today, each enterprise itself still turns out many standard parts in small numbers and at high cost; but we must still try to get to a point where each enterprises will concentrate on the production of certain specific standard parts and will produce these parts in series in such large numbers that the requirement of the entire shipbuilding industry can be met in this manner.

The enterprises themselves will thus be responsible for the centralized production of certain standard structural parts and for the orderly execution of the product in accordance with the standard.

We must fix the responsibility as to which enterprise will be accountable for which parts as far as procurement and production are concerned. The intra-plant production of standard components in the 1961 plan will therefore have to be shown as separate plan item, so that the management will have a chance to gauge the extent to which the measures for the improvement of the standardization task were implemented in the plant.

Possibilities for the centralized production of standard parts do exist in our enterprises in connection with the planned production volume for next year, if we look at the full utilization of our own machinery capacity from a different angle. At this time, our machinery

capacity is determined by the number of skilled workers available, e.g., for machining. The planning for the full utilization of this so valuable capacity however must be such that the full machinery capacity will be utilized in the shifts and so that the shortage of skilled workers in the machining phase will be overcome through multiple cross training.

It is natural that a series of medium enterprises in our shipbuilding industry will appear as central producers of standard parts. But it is no longer, justifiable to have the big shipyards place their orders on the basis of blueprints which contain standards that are no longer valid.

What does that mean? It means that the design bureaus are not sufficiently attuned to the new developments and to the technical peak level; it means that the products become disproportionately expensive and that the standard parts are not being procured but are being produced in uneconomical individual pieces. This is frequently the result of the difficulties in the changeover to new standards during the construction of certain ship series. Our series production however must not have the effect that we cause a bottleneck in the supplier industry.

We demand that in the future every drawing, which represents a cooperative order, bear the remark: "The standards specified herein correspond to the currently obligatory standards." Obligatory standards represent a sort of law and no one has the right to violate our own laws.

I emphasize once more that the designer determines the function, appearance, shape, and finally, the price of the product through his design. He determines what is to be standard and what he thinks should be a special product. It is up to him to influence the economy of the enterprise and finally also to reduce the scope of his own activity. The man who keeps creating completely new designs without considering existing designs is not a good designer; the man who uses known experiences to enrich his ideas is a good designer. In this respect we must improve the cooperation of our design bureaus from the bottom up.

The standards worked out so far represent an important part of the experience that has been collected. It is necessary to orient especially our growing young intelligentsia on these problems during their college and trade school study. It is necessary to eliminate existing prejudices against standardization through technical explanations.

The scientific work in the field of standardization under socialist production conditions is still absolutely inadequate. Together with the other socialist countries, the scientific consolidation and perfection of the theoretical foundations must take place at an accelerated tempo.

To this very day, there is not one textbook on standardization anywhere in the world. As a matter of fact, there are very few technical books on this subject to begin with. The only comprehensive description of the standardization of an industry is to be found in the Soviet book The Standardization of the Machine-Building Industry by Baranov Kuzmin.

The preparation of a textbook of our own in the German Democratic Republic was not started until the Leipzig Training Exhibit. We expect this book to be published in 1961.

But the curricula at our educational institutions must today give much more consideration to the problems of standardization. The partly deficient manning of our standardization bureaus with trained cadres is one of the concomitant consequences of inadequate training along these lines. Our young engineers and economists [production men] were not given enough training on the interrelationships in standardization; the partly widespread enterprise practice of assigning only those employees to standardization bureaus who could somehow be spared from direct production jobs certainly did not contribute to the prestige of our standardization engineers.

But designers even today often think that standardization is a pedantic, dry, and boring matter. This opinion dates back to the standardization tasks under capitalist production conditions. All instructors in the educational institutions and all the experts must understand fully that the tasks of standardization under socialist production conditions have changed completely and that standardization is today one of the most interesting tasks of every engineer and economist [production men].

The advantages of centralized production of standard structural parts must today be perfectly clear to every young engineer, economist, and instructor, regardless of where he is employed.

The important thing is to utilize the central producer enterprises to the fullest. The important thing is to limit the unjustifiably great number of identical parts. This too is part of our standardization effort.

Many supplier industry difficulties can be eliminated through such measures.

Let us look at two examples.

The failure to deliver architectural lighting fixtures by the deadline jeopardized the planned delivery of ships and badly jarred the production process.

What was the cause of this? On the basis of a fancy but hapharzard program involving small numbers of various types of items, the producer did not have the opportunity to make the transition from handicraft production to more rational industrial production. The cause was to be found in the concept of the architects of the shipyards, who designed, demanded, and ordered

a new fixture for every ship. As a result of a conference with the men involved and also through a consistent attitude on the problems of typification, it was possible to reduce the various models from 43 to 15. In addition to an improved supply situation, we also have a saving of 84,000 DM in the producer enterprise without any additional investments. The situation was similar in the case of mirrors. By cutting the required sizes from 47 to 7 and by shifting production from several enterprises, some of which were quite far away from the shipyard, to a centrally located plant, it was possible to save 42,000 DM a year without any additional expenditures.

What do these examples show us? In 1945 our slogan was "Production at any price." Today, we must say: "Production organization at any price." That means the use of the internal reserves of the plant, the release of impractically tied-down capacities, and more economical production through correct selection of materials, through application of type technologies, exploitation of the advantages of centralized production, and the introduction of new techniques. The examples we cited prove how simple and important it is to achieve a great gain through standardization and typification. Though the problems are posed in a different way in the small enterprises, plant selection series must especially here lead to a limitation of material assortment, the simplification of ordering and storage maintenance, and to assure the exchangeability of individual parts. It is natural that the problem of material waste depend on the large number of semifinished items which are used in a plant and that it depends on the plant's skill in using waste in its production, in basing the design of a ship on a few specific plate sizes and profile sizes. Each enterprise has its own goals on the gain than can be obtained from the standardization measures that are to be realized in 1960. The shipbuilding industry has set itself the goal of saving about 5.3 million DM through standardization measures. Though we are today not yet in a position to itemize our savings down to the last penny, it is correct and proper to approach all problems from the following angle: What is their economic usefulness? What do they contribute to the increase in labor productivity?

The management of the VVB has announced percentage figur[es] for use in estimating the effectiveness of standardization. Whether these figures are entirely correct cannot be proved today. But everyone can recognize that the gain is by far greater in neutral production of standard parts than when the individual parts are turned out by the shipyard itself. This realization is nothing new, but it must be emphasized again and again, since some officials still fail to understand this problem and simply do not want to shed a certain measure of plant egotism. But they must realize that they will get a decisive gain in their plant too if they take over the standards developed by other enterprises, if they can procure items cheaply and by the desired deadline.

Finally, a cost reduction in the individual parts is also expressed in the cost reduction for the entire ship and thus also brings the costs closer to the world level. This means that we will first accomplish those standardization tasks which promise greater gain and whose material [financial] advantages will be felt sooner.

What does the leadership of the shipbuilding industry expect from the Spring Shipbuilding Conference?

Each plant had to conduct standardization conferences in preparation for the economic conference; the results and findings of these standardization conferences are reflected in the material available to these conferences. The subsequent technical lectures will certainly trigger many discussions which require both additions and changes in the draft of the decision of the participants of the 1960 Spring Shipbuilding Conference. The lectures will stimulate you; they will get you to think about how you are keeping pace in your enterprise with the rate of development. The lectures are intended to get you to cooperate and not to wait until others put a job in your laps. The preparation of the lectures, the organization, and many more aspects of this conference were in the hands of the Chamber of Technology and was intentionally placed on the shoulders of the enterprise sections in order to entrust the latter with concrete tasks and to give their work impetus and content.

The expected results of all this preparation were not attained fully; many tried hard; many enterprise sections worked intensively. But how many experts in the enterprise are members of the German Chamber of Technology? -- starting from the plant manager, the technical manager, and down to the designers, engineers, foremen, and other technical cadres. Cooperative work is the road to the solution of the tasks. Only joint action will help us achieve maximum results and will solve the existing problems. Voluntary technical cooperative work -- that must again and again be the highest principle of all members of the Chamber of Technology. Anyone who thinks or acts otherwise is bound to fall behind and will not be able to attain the goal. The Chamber of Technology faces new tasks which we must master together in a short time in order to keep pace with the speed of developments.

Let us organize all forces, let us use the initiative of all workers, let us consistently and radically implement standardization, let us energetically tackle obstacles and resistance. If we do all that, we can be sure to attain the great goals of Seven-Year Plan and thus to contribute to the preservation of world peace and the respect of the other nations for the first German Worker-and-peasant state. In this sense, I wish the 1960 Spring Shipbuilding Conference ~~e~~very success.

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East Germany CSO: 4859

STANDARDIZATION OF SEMIFINISHED MATERIAL FOR THE HULL AND ITS TECHNICAL-ECONOMIC EFFECTS

/Following is a translation of an article by graduate engineer Hans J. Jesse, Warnow Shipyards VEB, Warnemuende, in the German-language periodical Schiffbautechnik (Shipbuilding Technology), Berlin, Vol. X, No. 9, September 1960, pages 435-442./

Address delivered at the 1960 Spring Shipbuilding Conference "Standardization in Shipbuilding" at Warnemuende.

The further buildup of our shipbuilding industry during the Seven-Year Plan and the fulfillment of the plans and of the reconstruction plan for our shipyards force us to apply rational standardization and to limit the current miltitude of dimensions of semifinished material for shipbuilding. This lecture is based on the current conditions at the Warnow Shipyard VEB in Warnemuende, and is to be considered as the outcome of a team effort involving the business office, the design bureau, the engineering division, and the production division.

This lecture is aimed mainly at the limitation of the current plante formats according to ZSN 1610 to one format only -- the so-called standard plate for the Warnow Shipyard VEB, Warnemuende.

To clarify the need for and advantages of the introduction of the standard plate for the Warnow Shipyard VEB, Warnemuende, it is a good idea to sketch past history briefly. Let us think back to the days when our Type IV (10,000-t motor freighter) was in the design stage. According to the procurement documents, we needed about 1,500 different formats of ship steel plate in the steel construction designs.

Of course, no rolling mill was in a position to turn out material to such specifications. The thing to do was to consolidate the dimensions, i.e., to adjust the number of dimensions to the possible delivery conditions; but here we had to accept an increase in material waste. Because of the multitude of dimensions in the plates used in a ship, we often had production breakdowns when material was not delivered in accordance with specifications and assortment. In order not to interrupt the production process, certain temporary expedients had to be employed because the plates needed at that particular moment in the ship's construction schedule were not available in the right dimensions. These provisional solutions of course caused increased expenditures in the way of design, material, or labor.

Let me cite two examples here.

A 110-sq m large outside wall was to be made for the coal and ore freighters to be built by our yard. The design bureau specified the dimensions of 1,400 x 4,500 mm (special format) for the plates to be used in the individual areal pieces. In this connection, 95% material utilization was to be achieved. The engineering division allowed 47 hours for the tracing and flame-cutting work. Due to an error in delivery, another ship under construction only had plates with the dimensions of 1,400 x 3,500 mm available for the production of these walls. With the help of this temporary solution, only 85% material utilization were attained. Now production took 54 hours. The additional costs during the engineering phase due to contract revisions must also be considered here.

The Warnow Shipyard VEB, Warnemuende, built double bottoms for Stralsund People's Shipyard VEB; this was an example of socialist assistance. In this case, four steel boards, size 9 x 1,500 x 7,000 mm, were provided for the production of floor plates. The weight of these plates was 2,960 kg, at a finished weight of 2,630 kg. Due to an error in delivery, no plates having these dimensions were available. Sheets of size 9 x 1,100 x 6,000 mm had to be used. To make floor plates of this size, it was necessary to use eight boards, equalling 4,750 kg [sic].

These two examples selected at random clearly show that temporary solutions always cause an increase in expenditures, be it for labor or material. To eliminate this confusion of plates, such as it existed in the design of Type IV, ZSN 1610 was set up as central shipbuilding standard for the standardization of ship steel plates. This ZSN 1610 constituted a great limitation on the over-all delivery program for hot-rolled steel sheets, dated 15 July 1955. The number of plate dimensions was reduced considerably. ...

... ZSN 1610 was fully applied for shipbuilding steel sheets in the design of the 9,500-tdw coal and ore freighter. Because of the partial elimination of previously described difficulties (errors in orders, etc.), the waste now could be reduced by about 4%. ...

... There is no doubt that the introduction of ZSN 1610 brought great savings and success in material utilization and ordering. But if we are going to reach the world standard or if we are even to participate in the determination of this world level, we must use our material even better; above all, we must have the possibility of turning out the kind of assortment of products which will under all circumstances assure us of having the material on hand when we need it, within the various phase deadlines.

This requirement then led to the development of the standard plate at the Warnow Shipyard VEB, Warnemuende. The partial use of this plate resulted in eight sets of plate dimensions for the construction of the Type IX bulk-goods freighter. This means that for every plate thickness only one format was used, though of course most of the plates had the same format. ...

... This is to be considered as the preliminary step in the projecting and design of the Type X ship for Deutsche Seerederei /German Ocean Shipping/ VEB, Rostock. Here only one format (standard plate) is used, regardless of all the thickness gradations.

The restriction of plate formats in the course of the yard's development can be illustrated with the help of four different successive ship series.

... Let us now take a detailed look at the advantages and disadvantages of our standard plate. I must expressly emphasize that we did not intend to single out the standard plate here; rather, we were trying to recognize and point out the obvious advantages for our yard in an objective fashion. Of course, one cannot deny certain disadvantages. The format of the standard plate was taken from ZSN 1610 with the dimensions 1,800 x 7,000 mm.

You might ask: "Why this format?" Here is the answer.

The length of 7,000 mm is determined by the slipway width /Hallenschiffsbreite/ of 25 m and thus gives us good production conditions along the hall, combined with good utilization of transportation facilities and of the crane capacity (maximum of 20 t for side section). The situation appears to be roughly the same at the Mathias-Thesen Shipyard VEB, Wismar. The width of 1,800 mm represents a compromise between the widths of 1,500 and 2,000 mm. The design bureau investigated this in detail and worked out a series of variants before deciding on this width. A smaller width can be used comparatively nicely in almost all designs but it brings with it a considerably larger number of welding seams. To be sure, a great plate width means less welding seams, but experience has shown that it causes much waste (unless, of course, the waste plate strips are used in some other way).

The shipbuilding projecting engineer and the designer at the Warnow Shipyard VEB, Warnemuende, goes about his work only from the viewpoint of the standard plate. Let us take a couple of examples to show that a few deliberations by the designer will make it entirely possible to get along with just one format, accompanied by comparatively little waste. Of course, the designer must do quite a bit more thinking; but this additional effort is well worth it.

1. The use of the standard plate for decks, inside bottoms, and bulkheads, i.e., for level areal sections, now becomes a matter of principle and does not cause any major difficulties. ...

... The different color hues show us that three different structural elements (positions /items/) are used.

(a) The material is listed as part of the bulkhead in the parts list.

(b) The material is procured from other structural parts (different drawing) via an intermediate storage depot (in this case, arranged by sections).

(c) Unused remaining material is sent to the intermediate storage depot for /use in/ other structural elements (different drawings).

2. In the case of the outer skin in the parallel or nearly parallel part, we can likewise use up the plates very well. In this connection, the section seams constitute certain reference points. Between these reference points, a corresponding plate distribution causes little waste and creates no basic difficulties. By using half a plate width, we can in most cases adjust the reference points. The distribution of plates is more difficult at the ends of the ship, since the decrease in the frame /bulkhead/ circumferences causes the plates to end in the form of trapezoids. But we can certainly say that the exploitation of the plate material does not have to be less favorable than when we use many formats (i.e., when we do not use a standard plate).

3. The bottom plate height creates somewhat greater difficulties. The ships built by Warnow Shipyard VEB, Warnemuende, this height is between 1,300 and 1,800 mm. But here too one can use 1,800-mm wide plates because the resulting waste strips can excellently be used for welded frame profile steels and deck girders /Unterzugsteg/. The material thicknesses are to be found at approximately identical limits.

In view of the possibilities the design bureau has in this respect, the plant management itself now maintains that the standard plate offers advantages in the production of our ships.

As we know, several yards -- such as Warnow Shipyard VEB, Warnemuende, and the Stralsund People's Shipyard, VEB -- have started the automation of plate processing by introducing automatic flame-cutting. In our opinion this very step constitutes an important problem in connection with the standard plate. If we compare the old and the new production process, we can clearly prove with the help of examples that the introduction of the standard plate is the only correct thing to do in line with our planned economy.

The production technology for the individual plates is directed into entirely new channels as a result of automatic flame-cutting. The elimination of the lofting shop and of the tracing shop have made the office of automatic flame-cutting the only unit that controls the entire process of plate distribution and the routing of the plate material waste and that will continue to be responsible for this in the future. In the future the standard plates will have to be distributed alone here in close collaboration with the design bureau (consolidation). At this time, the corresponding preparatory work is still being done in the design bureau. As a prerequisite for the assistance and support for the office of automatic flame-cutting, it is of course necessary for the designers to be fully familiar with the production methods; as we said before, the designers, in working out the plans, must give full consideration to the matter of the distribution of standard plates, also in the interest of the practical

and full utilization of the /cutting/ machines. An example, such as it looks from the angle of the office of automatic flame-cutting, shows how a construction of large side-tank bilge plates should not be executed....

... Now, some people might have objections to the use of the standard plate. We too wer originally of the opinion that the material waste will be considerably greater. I hope, however, that these few examples have demonstrated that the waste can be kept comparatively low if the standard plate is properly distributed.

As we get more and more experience in the preparation of pattern sketches, we will be able to get as much as 90% utilization out of our material, if we use the standard plate.

Some of our colleagues thought that one would have to go back to the system of individual order sketches, which was often used in the past, in order to cut the waste. But we feel that this process is impractical in the current situation. The delivery deadlines for semifinished shipbuilding items as we know cover a larger period of time (about one year), so that the material orders must in most cases be forwarded even before the completion of the project papers and references. In case of subsequent requests for alterations by the customer or by the classification institute (e.g., change of double bottom height, alteration of deck contours, change of thickness dimensions, etc.), we then run into great difficulties. Besides, the rolling mills will hardly be prepared to accept this kind of order documentation. But the advantage of the standard plate lies not only in the drawing of individual plates for automatic flame-cutting (drawing dimensions, measurement of negatives, etc.) but also in the loading of charging of the machine itself (work with machinery and equipment, using stencils based on these plate dimensions).

Since we always need a certain lead time for the individual machines, we will also have to stockpile much material there /sic/. If all dimensions and sizes are the same and if they differ only as to thickness, then there will be practically no chance of error and the storage space around the machine will not be as crowded.

In our opinion, we can introduce the standard plate through the introduction of the flame-automats; this must be a logical conclusion.

The standard plate exerts a favorable effect on the required size of the plate stockpile. The storage area in the plate depot at this time is 3,300 sq m; this surface is by far not enough to enable us to store the plates by type or style (the surface would have to be about 6,000 sq m). If we use the standard plate, we would only need about 60 different piles for one ship series. The required storage area and the maintenance needs (personnel) are thus considerably reduced. Besides, the introduction of the standard plate results in a considerable advantage for the rolling mills in

the Soviet Union and in the German Democratic Republic. The tonnage of the various individual dimensions is considerably greater; until now these quantities had to be distributed over various formats.

Now we must try to introduce the standard plates also in other shipyards, in order to get identical formats throughout the shipbuilding industry to the greatest extent possible. As a result of this, the rolling mills can turn out more material and in case of errors involving quantity, the system of socialist mutual plant assistance can be more effective within the individual enterprises. In such cases it will hardly ever happen that none of the other enterprises will have a certain format on hand.

The existing difficulties in starting a design using standard plates, such as they initially also existed at the Warnow Shipyard VEB, Warnemuende, can be eliminated through proper exchange of experience between the designers and shipbuilders of the Warnow Shipyard and the other enterprises.

On the subject of semifinished materials for shipbuilding in the form of profile steel (for the Warnow Shipyard this means mostly flat bulge profile steels), we might say that the selection series based on the existing ZSN standard must not be reduced. This would not help in the application of light structures in shipbuilding, since we would have to resort to the very much higher situated profile in order to guarantee solidity.

In conclusion, I would like to make a brief reference to the required mechanical and chemical quality values on the basis of the classification regulations. As we know, we get a majority of our shipbuilding materials from the Soviet Union on the basis of the GOST standards which are obligatory there. In our opinion it is not very practical to have the DSRK deviate from these conditions in its new K-group designations. This is the case particularly with the mechanical values (impact strength).

Summary of Discussions

In his remarks on the subject of the standard plate, our colleague Brueckner at first stated that this problem was often and passionately discussed by engineers and designers in the past. On the basis of the very short-term deadlines, shipbuilding faces the alternative of taking the plate which happens to be in storage. If the plate is larger than required, we of course get much waste; if it is smaller, we get an additional joint or a seam on the structural part. On the other hand, these difficulties are eliminated if a standard plate is available. It was mentioned furthermore that additional advantages emerge in the enterprise during the processing of the standard plate. For instance, mechanization could be perfected through the use of these plates

(hoisting gear with standardized jigs); the use of flame-cutting automats brings out the advantage of the standard plate. Our colleague Brueckner furthermore mentioned the advantage we would get in fully mechanized roller transport with suitable jigs when we use the standard plate -- in contrast to the hitherto customary transport means and conditions; or one could standardize the section lengths to a certain extent and thus also the lengths of the construction gauges. In conclusion, colleague Brueckner, in his capacity as practicing shipbuilder, unconditionally advocated the introduction of the standard plate with the objective of which would help simplify orders and specifications and would result in mutual assistance between yards.

In contrast to the statements of graduate engineer Jesse and engineer Brueckner, engineer Hirshmann of the "Neptun" Shipyard VEB in Rostock advocated the viewpoint that there was bound to be an increase in the so-called material waste if we were to decide on one plate size (standard plate).

Engineer Hirschmann tried to prove that the prewar shipbuilding industry ordered and received several hundred different plate sizes from the rolling mill and that the waste at that time amounted to only about 8%.

In summary, engineer Hirschmann maintained that the selection of only one format size for all plate thicknesses would be inadequate and that this would be bound to increase the waste.

Engineer Hirschmann submitted the following suggestion.

1. Plate thicknesses and format number to be so limited that good storage and procurement procedures will be possible.

2. The dimension of 1,250 x 6,000 mm for the 3-6 mm plate thickness.

3. The dimension 1,500 x 6,000 mm for the 7-10 mm plate thickness.

4. The dimension 1,800 x 6,000 mm, respectively, 7,000 mm, for the 7-10 mm plate thickness.

5. A plate size of 2,000 x 8,000 mm would also be advisable for the thicker plates.

Engineer Friedrich of the Mathias-Thesen Shipyard first discussed the standardization of the shipbuilding semifinished materials at his yard and recommended that all shipyards investigate whether the developed selection series of the Mathias-Thesen shipyard could not also be generally used in new constructions. In regard to the standard plate, engineer Friedrich showed that practical experience on several ships revealed that one can readily drop the longitudinal struts 6,000 -- 7,000 -- 8,000 mm in favor of the 7,000 plate. Only in the case of the widest plate, i.e., the 2,000-mm plate, should the length of 8,000 mm be kept for special cases. Engineer Friedrich did not support the suggestion for a standard plate from the viewpoint of the Mathias-

Thesen Shipyard; instead, he suggested a conference of experts which would develop a new selection series within the VVB.

Discussion speaker engineer Marlow, of the Stralsund People's Shipyard VEB, first sketched the general materiel situation at his yard and mentioned that the yard was often forced to seek substitute solutions. After a detailed team check in collaboration with the materials division, the production division, and the engineering division, it was shown that all shipbuilding steel plates are used only in one length -- i.e., the length of 7,000 mm. For the plate thicknesses, widths of 1,500 to 1,800 and 2,000 mm were fixed in accordance with the requirements. During his discussion, engineer Marlow established the requirement that the People's Shipyard set up its own optical tracing office; he also demanded that the yard examine the hitherto used angle and bulge profiles because of the switch from riveting to welding; he expects a great gain to the national economy as a result of this.

Concluding remarks by graduate engineer Jesse of the Warnow Shipyard VEB, Warnemuende.

In his concluding remarks, graduate engineer Jesse refuted the viewpoint of engineer Hirschmann who had stated thatethere would be an increase in the waste proportion due to the introduction of the standard plate. Graduate engineer Jesse assured us that the Warnow Shipyard would furnish the proof during the construction of Type X that the use of the standard plate would make it possible to get 90% materiel utilization. He welcomed the efforts of the Mathias-Thesen Shipyard in taking up the idea of the standard plate. Graduate engineer Jesse expressed the hope that a decision would soon be made along these lines on a higher level.

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TECHNICAL POSSIBILITIES OF REDUCING STANDARDS IN PIPING FOR SHIPS AND THEIR ECONOMICAL EFFECTS

/Following is a translation of an article by engineer W. Dutschke, German Chamber of Technology, "Neptun" Shipyard VEB, Rostock, in the German-language periodical Schiffbautechnik (Shipbuilding Technology), Berlin, Vol. X, No. 9, September 1960, pages 443-447./

Address delivered at the 1960 Spring Shipbuilding Conference "Standardization in Shipbuilding" at Warnemuende.

The Committee on "Piping" -- consisting of the "Design," "Engineering," and "Standardization" subcommittees -- was set up within the Shipbuilding VVB in an attempt to promote the industrialization of ship piping. The close cooperation of these three subcommittees constitutes the kind of team work which is intended to lead to the best solution of the recurring technical problems in piping. Since the Standardization Training Exhibit in Leipzig, this team effort has been further promoted and supported by the socialist standardization cooperatives in the shipyards. As of April of this year, we had about 240 standards in ship piping; of this number, about 70 must be revised in the light of modern technology.

This brings us to our actual topic -- the possible reduction of our standards, in an effort to give us larger production batches and to progress to the stage of standard-part production on an industrial scale. These 240 standards are by far too many. In addition we have the fact that many standards contain different types and forms which contribute to an even greater number of styles. Industrial pipe construction and rational production however call for a reduction in assortments -- i.e., styles -- to the extent that this reduction is technically justifiable. The table for round flanges ZSN 7110 according to TGL 5261 contains smooth light welding flanges with an ND /nominal pressure/ of up to 10 and to 16 and according to TGL 4514 it contains smooth welding flanges for the same nominal pressures. The two standards differ in that the first fits only for the pipe connections, and not for the fittings /armature/ connections, while the second fits fittings up to ND 16.

The smooth light welding flanges are 40% lighter in the section; at the "Neptun" Shipyard VEB, Rostock, this year alone they resulted in a material saving of ≈ 28.5 t. Since fittings

must be built into all piping we must always work with two different flanges; this leads to frequent confusion during the prefabrication phase. All fittings joints thus must be made with the heavy flange, so that two different flanges are attached to each pipe! Since the light flanges suffice to meet the requirements in shipbuilding, they must also fulfill their purpose in stationary pipeline construction. This means that fittings must in the future be made with connecting flanges according to TGL 5261.

This would mean a considerable saving in material which today is still being squandered to our disadvantage. This measure should only be welcomed in the socialist camp; by meeting this requirement, the shipbuilding industry will be making its contribution to the radical standardization effort. The institutes and the central agencies for standardization in the various industry sectors must energetically advocate this.

The enterprise frequently voices the complaint that the flange connections on the machinery and pumps that are delivered again and again require special flanges which the plant must make itself at great cost. Here, too, there is a need for coordination with the "Pumps and Compressors" Sector of the industry.

What we have said so far indicates that radical standardization is not being given sufficient consideration. Every industry sector sets its own targets and the standardized selections are thus unjustifiably large in number. The shipbuilding industry took a big step forward by creating and introducing the light TGL welding flange; this will be a great contribution to the success of our Seven-Year Plan.

The "Karl Marx" Measurement Equipment and Fittings Plant at Magdeburg came up with an improvement suggestion for providing the red brass valves with steel screwed flanges; this suggestion makes it structurally necessary to flange the copper pipes themselves and to stop using the flanged-coupling pulley [flanged disks] according to TGL 5260, in order to get a sufficient sealing surface. A corresponding sector standard has been submitted for approval. Simple tension devices make it possible to flange the ignited-copper pipe in such a short time that the use of the flanged-coupling pulley [flanged disk] becomes uneconomical. The flanging of the smaller nominal widths also becomes economical through the use of tested mandrels [drift pins].

In recent years a whole series of industry sector standards were worked out; their introduction into design and production is lagging because the central producers still have not been found. The shipyards are often forced to make welding studs, screwed joints, flanges, and partly even screws, etc. In 1959, the "Neptun" Shipyard VEB, Rostock, for instance had to spend about 500,000 DM more for items it had to make itself. This intolerable

situation must absolutely and quickly be changed, otherwise we will not be able to make the economic gains which each yard is supposed to make as a result of standardization in 1960.

The shipyards can and must become assembly plants; that is why measures for the smooth and timely delivery of the standards must be taken quickly. Due to the partly completed /shipyard/ reconstruction, the current cooperation enterprises often reject the further production of standard parts. Years ago it was demanded -- and the Shipbuilding VVB are now trying -- to have one single enterprise produce standardized parts, which occur in only one industry sector, for all the VVB. This is already being done in other industry sectors; but we are still behind in this respect, although in our sector standards we have comparatively small production batches which are not worth farming out to other plants in order to attain the production goals.

We know that the industrial production of standard parts offers a very great economic gain which we however cannot yet register in our standardized parts in our industry sector, since the central production setup is lacking. We can therefore estimate the gain only roughly. In case of production in the yard itself, the gain is 10%; in case of production in various supplier plants, or in case of centralized production in shipyards, it is 25%; and in case of centralized production in supplier plants it is 50%. This is a cautious estimate; the gain is probably greater.

Now let us take up the missing standards in our piping construction.

All necessary fittings are still being ordered and procured according to catalogs. The ZSN fittings standards established hitherto must urgently be revised and supplemented; all fittings must get a simple code designation and all designations must be compiled in a table of ship fittings. The confusion which still occurs at the depots would thus be eliminated and each yard could also work on the basis of the production documents of other yards.

The designers are demanding standardized determinations of working materials for various pipeline systems with pipeline wall thicknesses which correspond to the classification directives. Likewise, we have no standards on flexible connections, PVC pipe with connecting pieces, and others. For the further promotion of industrialization in piping, we must have a standards folder containing the obligatory standards which must be applied. In this manner, the industrialization would be uniformly adjusted and promoted in the entire shipyard level. The first step in this direction is the suggestion of the collective of the Shipbuilding Institute; this suggestion called for the specialization of the shipyards in the field of standardization; accordingly the system of standardization in piping is to be worked out by "Neptun" Shipyard VEB, Rostock. In this connection it should be pointed out

that a segment flame-cutting machine at the "Neptun" Shipyard can be used to cut the segments for pipe elbows in our entire industry sector. The welding of the segments into finished elbow pipe cannot be done at the "Neptun" Shipyard at this time because its welding capacity is too small.

It would be a big help in reducing the assortment and styles if it were technically possible to be able to do without this or that nominal width. NW /nominal width/ 175 is much disputed. The fittings divisions reject it outright. At the last "Piping" Conference, opinions were at first divided on keeping or discarding this width; but it was finally decided to keep it. This decision was justified with the assertion that NW 175 pipes rarely have fittings connected to them and that if this does happen to be necessary, a transition piece to the fitting can be built in. But we only need a few meters of NW 175 pipe in ship piping per ship in order to save space. A dispute is also going on in connection with the standardization of the T-branch and angle pieces -- i.e., fittings -- because of the great tolerances due to production conditions and the shape of the ship's hull. I would be happy if we could cover this point in our discussion.

Summary of Discussions

Colleague Stoeckmann -- Central Standardization Office at the Shipbuilding Institute in Rostock.

I would like to second colleague Dutschke's statements with explanations and hints. The Shipbuilding VVB have asked us to reduce the still existing 1,500 plant standards in the shipyards by 80-90% within a short time and to convert them into industry sector standards. The existing industry sector standards are to be revised and reduced as far as required. In this connection it must be determined whether the pressure ranges can be limited to ND 16 and whether the nominal widths -- up to NW 50 inclusive -- can be broken down into a rougher gradation. To determine the gain and the possibilities of the pressure ranges, it is suggested that these investigations be made by the Enterprise Section of the Chamber of Technology at the Neptun Shipyard.

Colleague Unger -- "Karl Marx" Measuring Equipment and Fittings Plant VVB, Magedburg.

By 1965, we must have a 190% increase in the production of the fittings plants. Without radical standardization, we will not be able to attain this target. Measured against our total production, the production of ship fittings is very small and the items are turned out in many small batches because of the great varieties in style. For instance, we have orders for NW 15 to 200 stop valves in grey cast iron, in cast steel, in red brass /cast brass/, zinc-free bronze, and steel plate. The orders are

particularly unfavorable in the case of valve boxes [casings]. The annual production of 600 valve boxes gives us models with about 400 different styles. The reduced flanges so far have been authorized only for use in piping. It will not be readily possible to provide for their use also in connection with cast fittings. But this does not mean that we reject the suggestion outright. We are now delivering to Peene Shipyard VEB, Wolgast, fittings made of sheet steel with light flanges; and the Shipbuilding Technology Institute suggested that we take into consideration many sheet steel fittings in our standardization effort. We approve of this suggestion. Our "Ship Fittings" Socialist Cooperative thus faces many tasks which can be accomplished only by a combined effort of producer and consumer. We have the support of the "Piping" Committee of the Shipbuilding VVB.

Concluding Remarks by Colleague Dutschke

I would like to thank colleague Stoeckmann for his remarks. I did not go into the plant standards, since they are in the future to contain only intra-plant selection series from industry sector and DDR standards. The reduction of the NW and ND would mean a significant saving. The possibility of reduction should also be looked into in cooperation with the "Piping" Committee.

It is gratifying to note that the fittings industry does not outright reject the use of the light flange in connection with cast fittings. As a result of the production of fittings from sheet steel, we have taken another step forward and this is to be welcomed. The question is only whether the price difference between the cast and extruded fittings is justifiable and whether the equipment (presses, dies, welding facilities) are available in sufficient quantities.

The Ship Fittings SAG [Soviet Corporations] will certainly clear up this question.

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TASKS OF STANDARDIZATION IN THE CONSTRUCTION OF EQUIPMENT FOR THE SHIPBUILDING INDUSTRY

/Following is a translation of an article by engineer W. Hentschel, German Chamber of Technology, Stralsund People's Shipyard VEB, in the German-language periodical Schiffbautechnik (Shipbuilding Technology), Vol. X, No. 9, September 1960, pages 448-452./

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The constant expansion and improvement of equipment construction /design and construction of jigs and fixtures/ are urgent necessities if we are going to have maximum economy in production, if we are going to reduce the processing time, and if we want to improve the quality.

This also applies to the shipbuilding industry and especially th those shipyards which produce in series. But in addition to the hull as a whole, this also involves extensive inter-enterprise cooperation, to the extent the latter involves corresponding batch sizes.

This equipment construction /jig and fixture design/ is to be investigated as a special point of main effort in the framework of our standardization; in this connection, special attention is to be devoted to the scope of all those equipment items which are needed for the construction and completion of the hull. There is a special reason for this. Let us first look at equipment construction within the framework of prefabrication /preliminary work/ from the cost angle; we find a few rather interesting figures here.

For ships that are between 24 and 73 m long, an averageof 50 m of length -- which is about the length of the medium trawler built by the Stralsund People's Shipyard VEB -- was taken as basic value for this study. The width of this ship was assumed to be 9 m and the height was taken to be 5 m, assuming we have 100 frames. If we build such ships in batches of five to 20 in an assembly line, we need a preparatory work effort /prefabrication/ of 95 DM per cu m of L x W x H of the ship.

These costs include design, material, and production for the equipment construction phase. We can see that the equipment gets to be increasingly cheaper in larger series. A simple calculation of the total costs, distributed over the ship series, would always give us this result.

If we compare these figures, considering the standardization factor, we can say the following: if we use standard foundations, standard construction tables /Bautische/, sectional construction equipment /devices/, control gauges, transport devices, etc., we need only 75 t of ship steel plate and profile steel in the material sector for the same ship type, while we would need 130 t in if we use the old construction method.

But this is only one of the many examples which I would like to spell out to you now on the basis of which the Stralsund People's Shipyard VEB is in a position to save 185 hours per medium trawler in 1960. This corresponds to an annual saving of 16,650 hours in the equipment construction division of this shipyard (not including costs of material)....

Summary of Discussions

In the discussion on the topic of equipment construction, the "Neptun" Shipyard VEB of Rostock offered further hints on standardization. It was suggested that the round of beam height /camber of beam/ be altered to arcs with 50/b in order to get consistent design dimensions in the equipment construction for the hull.

The discussion speakers furthermore brought up the use of plug gauges templates /stecklehren/ for flat sections down to the level ground, according to the sample of the Warnow Shipyard VEB, Warnemuende. These gauges offer great advantages because of their light construction and the small material expenditure for the flat section construction.

The use of a common catalog for equipment must be one of the objectives of the shipyards. As of now, the Warnow Shipyard VEB of Warnemuende, the "Neptun" Shipyard VEB of Rostock, and the Stralsund People's Shipyard VEB are working along these lines.

The "Edgar Andree" Shipyard VEB, Magdeburg, which makes vessels for inland navigation, suggested the formation of a socialist cooperative, similar to the Piping Committee, on the VVB level; the idea here is to attain greater exchangeability in the standardization of the structural elements for machinery.

Centralized production in one shipyard of the VVB has also been suggested.

The Magdeburg shipyard has subdivided its equipment pool for hulls into certain groups because of its space problem. The yard uses foundation racks for flat sections and for particularly complicated shaped sections. The yard is also trying to get uniform frame intervals in order to have ship frames and equipment frames (negative frames) as identical supports. Slotted wedges for light sections and stretching screws for heavy sections are also used there as stretching elements.

The system of sliding roofs above the equipment section is also a good idea; these sliding roofs make it possible to turn out quality work during bad weather.

The use of the Leonard set for turning gear [jacking engines] was highly recommended by the "Edgar Andree" Shipyard VEB in Magedburg.

In summary, these hints offer the Shipbuilding VVB suggestions for the initiation of measures in equipment construction which must lead to a standardization plan with specific savings even during 1960.

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East Germany CSO: 4859

STANDARDIZATION IN SHIPBUILDING EQUIPMENT DEMONSTRATED ON CRANES

/Following is a translation of an article by engineer H. Werth, German Chamber of Technology, Eberswalde Crane Plant VEB, in the German-language periodical Schiffbautechnik (Shipbuilding Technology), Berlin, Vol. X, No. 9, September 1960, pages 457-460./

Address delivered at the 1960 Spring Shipbuilding Conference "Standardization in Shipbuilding" at Warnemuende.

1. General Remarks

We must have a consistent standardization effort not only in the reconstruction effort of the enterprises but also in the development of technology as a whole.

The development of standard products is intended to make it possible for the producer enterprise to employ series production, combined with more economical production, better engineering, and reduction in production costs. On the other hand, the consumer is supposed to enjoy the advantages of favorable spare parts stockpiling, cheaper products, and product exchangeability as a result of standardization.

In determining the details of standard products, the enterprises have certain special obligations toward the consumers. The styles of standard products must extensively meet the requirements of the consumers.

In joint conferences, the most essential characteristics of these products must be worked out, in order to arrive at optimum standard products. The standardization of the deck luffing cranes was taken up specially in the framework of plant group coordination; in this connection, special factors had to be taken into consideration.

Electrically powered deck luffing cranes predominantly come from the supplier plants of the electrical industry. The special requirements of the shipping industry call for special electrical products whose development must be handled in a systematic fashion.

But this assertion cannot be understood as an excuse for the cranemakers to delay their end of the standardization effort.

Standardization is dependent on technological development as a whole and in every case constitutes only a temporary solution.

The progress of technology requires the continuous revision and adjustment of standards.

2. Principles of Standardization for Deck Luffing Cranes

Deck luffing cranes are needed in larger numbers for passenger vessels and freighters as piece goods and grab cranes. Since most of the grab cranes have a capacity of 5 t, the standard piece goods cranes were taken up first. Passenger vessels as a rule have sufficient electric power available during the operation of the cranes, because the few cranes call for relatively little extra power, compared to the total electric power capacity.

We could thus get rapid working speeds and hence greater installed capacities, without jeopardizing the economy of the operation. This requirement is further stressed by the fact that port layover times are often so limited in the shipping schedules that the cranes must have high transloading capacities.

In standard freighters, the installed capacity of the deck cranes however involves the most essential part of the power to be furnished during the port layover time; hence, more attention must be devoted to the economy factor in the determination of the installed crane capacity.

Here, the concept of "economical transloading capacity" must therefore be subjected to special examination in the investigation of standardization.

3. Construction of Cranes Initially Earmarked for Standardization

The construction of standard cranes is not to be changed for the moment and in principle will continue along the lines of the tried and proven bell model (Figure 1).

For technical data, see Table 1, Eberswalde Standard.

3.1 Capacity

Deck luffing cranes are used most in ports which have no or only few cranes. In addition, some ports do not have enough pier length to handle the freight volume. In such ports, the deck luffing cranes are a good way of loading quickly freight from ships in the roadsteads onto lighters or barges and also to take on new cargo in this manner.

If we are going to determine certain specific capacities for typified cranes, we should not consider special ships for certain particular cargo; rather, our investigations must be based on the most common transloading goods.

The kind of transloading freight and the possibilities for loading operations are determinant factors for the maximum lifting load to be considered.

Here are the most important transloading goods.

3.11 Cement in Bags and Goods in Similar Containers

Cement as a rule is packed in 50-kg paper sacks and is brought to the ship in covered freight cars or covered barges. The cement sacks are stacked on loading pallets on which they are moved to the ship.

3.12 Potash and Other Bulk Goods

In many cases, potash and other bulk goods are transloaded in full buckets if no grab cranes are available.

3.13 Cotton or Other Baled Goods

Cotton bales, tobacco bales, or similar items were loaded or unloaded with nets. The nets are spread out and after loading are hooked into the loading hook with four eyelets.

3.14 Piece Goods

The crane loads during the unloading of piece goods vary greatly. Where possible, the goods are assembled in several handy parcels.

But this cannot be done for all kinds of piece goods; hence, we cannot specify any loads for the type series.

In many cases, the deck cranes do not suffice in this kind of loading operation and port cranes must be used.

3.15 Containers

Transloading methods will be basically improved as containers are used on a larger scale. We can expect special crane requirements calling for greater capacities in the case of such special ships.

A deck luffing crane with a capacity of 5 t will suffice to meet such requirements for the moment.

3.2 Determination of Capacity

In evaluating these transloading goods, we get the following capacity sequence.

A crane with a capacity of 1.0 t will be needed mostly for baggage transloading to and from passenger vessels and doesnot suffice to handle piece goods of a more general nature.

Cranes with capacities of 2.0 and 3.2 t will play the most important role for standard freighters. Rarely encountered heavier piece goods do not generally justify the installation of cranes

with greater capacity and the attendant greater installed capacity. To handle heavy piece goods, a cargo hold should be equipped with cargo winches which can be adjusted so that they can handle heavy cargo, since the deck luffing cranes, after all, do not displace the cargo winches but should supplement them effectively.

A crane with a capacity of 5.0 t must also be included in the type series, so that we can meet the requirement for special cases.

These capacities constitute an adjustment to the standards of crane construction. Both the port cranes and the deck luffing cranes must do the same kind of work and for this reason must also be typified according to the same standards.

3.3 Length of Jib

We get various requirements for the length of jib within certain limitations as a result of the location of the cranes on the ship and due to the dimensions of the cargo holds.

If we have cranes on both sides, a smaller jib length may be adequate; on the other hand, if we havelonger cargo hatches and if the crane is placed amidships, we will need greater jib lengths. The 10.0, 12.5, and 14.0 m jib lengths are considered to be adequately graduated.

3.4 Working Speed

Lifting and lowering.

The capacity of a deck luffing crane is often judged by the speed at full load.

The hoisting gear of course takes up most of the required time in a certain loading function, but this is not only due to lifting at full load but also due to

lowering at full load,
lifting -- empty,
lowering -- empty.

To judge the transloading capacity of the crane correctly, we must take into consideration the total time the hoisting gear is turned on.

The transition from DC to AC in shipbuilding brings with it certain disadvantages in crane construction which can be made up. The relatively good adjustability of DC is eliminated in when we use AC and gives us poorer figures in the over-all evaluation.

This dtudy also explains why many cranemakers are suddenly starting the development of electro-hydraulic deck luffing cranes.

For the moment, the hoisting speeds are determined in accordance with the currently available motors at 16, 25, and 40 m x $\min^{-1}$.

Further studies, using change-pole motors, should then give us more economical hoisting speeds which can be worked into the standard at the given time.

Explanatory Remarks

3.5 Rocking and Turning

Rocking and turning does not influence the transloading capacity to any great extent; but we selected these figures relatively high in order to assure smooth loading operations; in this connection, the superposition of the hoisting movement on the rocking and turning motion was also taken into consideration.

In the typification of the deck luffing cranes, we further determined the smallest jib length, the hoisting heights, the structural heights, etc., which to some extent depend on the design.

The determination of a standard in this regard must however always leave room for further development; but, quite independently of the further development, it is absolutely necessary always to have a valid series of standards [standard sequence] which will be of benefit both to the consumer and to the producer.

4. Further Development

Allow me to make a few brief remarks on how the development of standardized deck luffing cranes is to be handled in a planned fashion.....

.....Instead of the bell construction, we should install a ball-bearing turntable [swivel mount]. This will give us the advantage of freeing the space in the center [of the ship], where we can then put equipment; as a result of this, we can get a more compact construction.

Then all machinery and electrical components will be protected against sea water, which in turn makes for considerably easier handling and maintenance and less wear and tear.

We must try for a shorter minimum jib length (which could not be achieved because of the construction used so far) in order to keep the dead space on board [deck], which is not covered by the cranes, down to a minimum.

We must aim at a better utilization of the installed capacity. In case of long hoisting distances, the installed capacities for the rocking and turning mechanism are unused, though they are made available by the power center.

The structural height of the deck luffing cranes must be kept as small as possible; this is necessary, on the one hand, in order to keep the center of gravity low, and, on the other hand, in order to give the helmsman the best possible field of vision, e.g., during

estuary trading [navigation]. These are essential points in the further development of standard cranes.

5. Current Development Projects

At this time, projects areunder way involving the standardization of the individual assemblies for deck luffing cranes. The design bureau of the "Klement-Gottwald" VEB in Warnemuende, under the direction of our colleague Arndt, exhibited particular initiative in this respect.

The standardization of the following individual assemblies forms the foundation for the development of standard product:

(1) hook gear,
(2) cable pulleys,
(3) wire cables,
(4) overload guard,
(5) slack-rope guard for hoisting gear,
(6) Cable system,
(7) hoisting gears with cable drum, (this problem is to be solved in cooperation with the Leipzig Gear Plant)
(8) differential terminal switch,
(9) rocking unit with cable drum, (this problem is to be solved in cooperation with the Leipzig Gear Plant)
(10) turning unit, (this problem is to be solved in cooperation with the Leipzig Gear Plant)
(11) step bearing in support pod, top.

6. Summary

In summary, we can say the following.

The first phase calls for developing the individual assemblies of the deck luffing cranes as standard parts so that they can go into production.

In the second phase, we determine an interim solution on the basis of the currently available motors as standard series, which are to be expanded in the third phase, after successful testing using change-pole motors in accordance with the technical data given.

Parallel to this, we have the fourth and fifth phases, which include the development of the new crane model with electromechanical and electrohydraulic drive.

Once the development work has been completed, these cranes will then replace the standard products.

In line with the open letter of Deputy Prime Minister Walter Ulbricht, it is however important to accelerate this development for the benefit of all.

Summary of Discussions

The various discussion arguments did not go especially into the problems touched on in the lecture; rather, we essentially had a presentation of further statements on standardization in other ship equipment parts.

For instance, colleague Witzke of the Shipbuilding Institute in Rostock, mentioned the standardization of the anchor capstan for the individual size ranges with various motors; in addition, he also broached the problem of the warping capstan, of the cargo winches, and of the light-goods cargo masts.

In conclusion, colleague Witzek stated that the existing standards in ship equipment amount to about 300 and that this number must be increased in order to get better exchangeability within the spare parts problem.

Colleague Bring, Central Standardization Office, devoted his remarks mostly to the typification of ship electrotechnology and stressed that new working methods must be developed, so as to guarantee the faster introduction and processing of standards.

The current situation is unsatisfactory. He concentrated his suggestions on three main points.

(1) Stepped up development of standards in producer enterprises turning out electric articles.

(2) The standardization bureaus of the big shipyards must either hire electrical engineers and technicians or must draw personnel from the ship electrical engineering division, so that they can handle the development of standardization-plan projects in addition to the independent accomplishment of electrical standardization tasks in the yard itself.

(3) The ZVS must be relieved of the burden of developing standardization-plan tasks, so that it can devote its full strength to the coordination, guidance, and checking of standards.

Under the motto "the ship must be a whole," colleague Damm of the Rostock RFT emphasized that the standardization of the structural parts of equipment is essential in the evaluation of the entire installation. He called for better collaboration between the individual electrical engineering divisions and the Rostock Shipbuilding Institute, in order to step up the standardization measures. Although the unit numbers of the RFT installations are small, savings can be achieved.

In his concluding remarks, colleage Werth of the Eberswalde Crane Building VEB stated that it is gratifying to see so many people advocating and promoting a speed-up in standardization.

He showed with the help of an example that not only the development of new standards but also the testing of the existing standards is of utmost importance when it comes to making savings.

A socialist cooperative in the Eberswalde Crane Building VEB checked the existing standards and eliminated 83% of them; in the future, only 17% will thus be considered obligatory, which makes for better series production.

East Germany CSO: 4859

RESOLUTION OF THE 1960 SPRING SHIPBUILDING CONFERENCE "STANDARDIZATION IN SHIPBUILDING"

/Following is a translation of an unsigned article in the German-language periodical Schiffbautechnik (Shipbuilding Technology), Berlin, Vol. X, No. 9, September 1960, pages 461-462./

Recommendations of the Chamber of Technology to Shipbuilding VVB

The Seven-Year Plan of Peace and Victory of Socialism in the German Democratic Republic confronts us with the task of attaining the peak level in science and technology in the shortest possible time and to bring out the effect of these gains in production. This calls for the rapid development of the production forces. Important prerequisites must be created for this through standardization.

The participants of the Spring Shipbuilding Conference recommend that the Shipbuilding VVB take the following measures and pledge that they will cooperate in the rapid implementation of these measures. The Vehicle Building and Traffic Committee of the Chamber of Technology in Rostock Bezirk and the Shipbuilding VVB are entrusted with the guidance and supervision of the implementation of these measures within their areas of activity.

1. The tempo of standardization work must be stepped up as an important prerequisite for the rapid development of the production forces in shipbuilding.

2. In order fully to utilize the standardization bureaus of the enterprises, any unrelated work, which is still being done there, must be discontinued.

3. The initiated specialization of the standardization bureaus of the enterprises in the various special fields -- such as equipment, installation, and piping -- is to be continued and must be completed, since this will make for simpler and faster processing.

4. To reduce the average processing time for the industry sector standards from 10 to 7 months, the method of the "Heinz Mueller" movement must be applied consistently and a competition must be organized among the standardization bureaus of the enterprises.

5. A long-range plan must be worked out for standardization; this plan must also contain the requirements of the shipbuilding industry as far as the supplier industry is concerned. This long-range plan must be kept up to date according to the latest discoveries and on the basis of the suggestions of the workers.

6. An attempt must be made to make the supplier industry gradually responsible for the development of standards which involve standard parts to be produced by the supplier industry. This fact must be taken into consideration in the preparation of the long-range standardization plan.

7. To assure top quality for standards, it is necessary to promote close cooperation between production workers, engineers, designers, and material supply officers.

8. To meet the increasing tasks, it is necessary to draw the colleges and trade schools into this effort by assigning them suitable problems for solution.

9. The standardization of entire complexes, especially as regards furnishings must be stepped up in order to achieve improvements in the production process here too.

10. In order to make sure that the standards will also fully take into consideration the needs of the inland shipyards, the latter must be drawn into the standard development effort to a greater extent than hitherto.

11. In case of supplier industry products that have not yet been standardized, the number of sizes and styles must be limited to the technically necessary minimum as a preliminary step prior to standardization.

12. All reused production drawings on hand must again be checked for compliance with existing standards also in case of cooperative orders or contracts.

13. In order to make allowance for the progress of technology in shipbuilding also in the field of standardization, it is necessary to check the existing standards of the shipbuilding industry. Special attention must be devoted to the increased use of new working materials and modern working methods. The revision of standards must always be handled by the enterprise which developed the standard.

14. The development of plant standards is permissible only for intra-plant selection series from industry sector and DDR standards.

15. The supply of the enterprises with standards sheets and the amendment service for these sheets must be improved in connection with the initiated specialization of the enterprises in the field of standards development. It must be investigated whether it is practical to issue standards in a printed form in the future.

16. In all development and projecting work, the application of the existing standards must be assured and attention must be paid to the maintenance of capacity series /sequences/ graduated according to norm figures.

17. If necessary, new standardization projects are to be derived from the development and projecting work.

18. The degree of standardization must be determined for the design phase, so that gaps in the standardization effort can quickly be closed and so that the degree of standardization can be increased.

19. The backlog in the standardization of equipment construction must be eliminated by including this division into the standardization effort.

20. To avoid duplication, it is necessary to improve the exchange of experience and information on standardization plans and intentions. In this connection, a bulletin must be published by the Central Standardization Office for Shipbuilding.

21. In order effectively to support the division of labor and the specialization of production in the entire socialist camp, there must be closer collaboration with the standardization agencies of the other socialist countries.

22. When contracts are signed with foreign customers, an attempt must be made to agree on the application of the standards valid in the German Democratic Republic.

23. The principal gain from the standardization effort will come from the centralized production of standardized parts in special enterprises. Therefore, the measures initiated for the shifting of standard structural parts or components to centralized production must quickly be executed with the help of the enterprises; it will be necessary to make sure that production, including the preparation of material, can be launched as soon as possible. The introduction plan must absolutely be adhered to in this regard.

24. A producer list is to be drawn up for standard parts and must be made available to all shipbuilding enterprises; an organized amendment service must guarantee that the list will always be up to date.

25. Negotiations must be conducted with the Machinery and Vehicle Supply Office in Rostock and the Ship Supply Sector on the formation of a central delivery depot for standard shipbuilding parts; this must be done in order to make sure that repair and replacement parts will be quickly available so that the idle periods of ships can be reduced.

26. The technological and economic requirements must be worked out at the start of construction as a prerequisite for the determination of the economic gain of the standardization effort.

On the basis of the experiences to be evaluated, a method is to be worked out according to which the economic gain can be determined. This method should replace the simplified process valid for 1960.

27. Socialist cooperatives must be formed in order to implement these measures; these cooperatives must solve the problems on the basis of a work program.

The Participants of the 1960
Spring Shipbuilding Conference

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INSULATING PROBLEMS IN SHIPBUILDING

[Following is an article by graduate economist K. Moerbel, German Chamber of Technology, Technical Manager of the Insulation and Refrigeration Technology VEB, Rostock, in the German-language periodical Schiffbautechnik (Shipbuilding Technology), Berlin, Vol. X, No. 9, September 1960, pages 462-466.]

Address delivered at the "1960 Refrigeration Conference" of the "Energy and Water" Committee of the Chamber of Technology in Warnemuende.

The lecture is intended to familiarize the refrigeration and shipbuilding industry experts with the problems of insulation technology and to launch an exchange of information, as well as to initiate better cooperation.

The first part of the lecture covers the effect of insulation values on the dimensioning of refrigeration plants.

The various problems cannot be answered in detail and specifically at this time, since the experiments currently in progress will not be completed until 1961.

In the second part of the lecture, we have a discussion of the insulating materials which have been developed in the German Democratic Republic and which can be used in shipbuilding.

The third part takes up the problem of noise control in shipbuilding.

I. The Effect of the Insulation Values on the Dimensioning of the Refrigeration Plants

The construction of refrigerator ships has increased rapidly in recent years. This brought various problems to the fore which must now be solved. For the precise projecting of ship refrigeration plants, we need reliable advance determination of the refrigeration losses in the ship's refrigeration holds, since about 40-80% of the total refrigeration requirement must be expended for the evacuation of the heat quantities resulting from insulation.

It is very difficult to calculate these losses, taking into consideration all difficulties to determine heat conductors, such as cargo hatches, deck pillars, frame angles [bars], etc.; in

addition to this difficult task, we must also know the moisture penetration degree of the insulation and, in connection with this, the dependence of the heat conductivity figures on the moisture of the substances.

The insulation of ship refrigerator holds reveals a peculair feature: heat conductors, such as the frame, etc. -- i.e., iron parts inside the insulation -- appear as a rule, while ordinary smooth insulated surfaces are the exception. (The determination of the heat current through these heat conductors constitutes the actual problem in the determination of the refrigeration losses.)

Joelson devised a computation method for this; here, the current lines issuing laterally from the frame are replaced with arcs and the wall thickness to the center of the current arc is taken as the length of the largest arc.

Niemann described a "modified Joelson method" which simplifies the computation and at the same time increases its accuracy. If we compare measured nominal average heat conductivity figures of three refrigerator ships to the figures computed by the "Joelson method," we get deviations of up to + 20%; on the other hand, the deviations for the "modified Joelson method" are only ± 3%.

I do not have enough time here to go into the details of the method and give the computation formulas.

The quality of an insulation can also be considerably reduced when the insulation material takes on moisture. In this connection, hygroscopically-bound moisture, which always occurs in an insulating substance, will exert little influence on the insulation capacity and durability of this substance. But an accumulation of free water can have a considerable effect; the heat conductivity can rise by several 100% and the conservation of the grounds and of the light metal covering becomes very difficult, if not impossible. This would long ago have led to catastrophic results unless mostly considerably reserves -- about 100% and more per heat conductivity figure of the insulation -- had been allowed for in the computations for the projecting of refrigeration holds. Experience shows that these reserves are used up. This in turn causes higher operating costs, combined with increased wear and tear on the machinery.

For these reasons, we cannot assign too much importance to the economic significance of the moisture accumulation in ship insulation from the viewpoint of the life of the insulation and the adjoining materials, and from the viewpoint of the operating costs of the refrigeration plants.

Such an accumulation of free water is possible as a result of water vapor diffusion and capillary water movement. Water absorption through steam diffusion results from the partial pressure head of the water vapor during a large part of the year, when the temperature of the refrigeration hold is below the outside temperature.

The water vapor penetrates into the insulating substances and condenses in the interior in places where the saturation temperature is not reached. This moisture probably comes predominantly from the bilge in the form of water vapor content of moist air and passes through the hatch curb [skirting, border]; under the influence of the surface tension, it then moves along the outer skin.

The capillary effect of most insulating substances also promotes this moistening in connection with the formation of condensed moisture, leak damage, etc., since the capillary forces seek to bring about a balance between the moisture differences.

Measurement figures on this have become known only in a few cases; they are very contradictory. These moistening processes affecting ship insulation are physically so complicated that we cannot hope to get an exact mathematical determination of the moisture content of the insulation to be expected -- considering the present level of research.

To clarify this problem, we must make empirical investigations on the heat, liquid, and steam movements in insulating substances used in refrigeration holds and we would also have to test suitable improvements.

The Research and Development Office for Ship Insulation of the Rostock Insulating and Refrigeration Technology VEB started these investigations some time ago. But the project will not be completed until next year, respectively, the year after that.

I therefore do not want to present any specific findings at this point; I only want to present a general summary of the over-all problem.

II. Remarks on the Insulating Substances Developed in the German Democratic Republic

As we know, we have the following requirements for insulating substances used in shipbuilding and serving for the insulation of ship side walls, bulkhead walls, boiler shaft walls, and cabin partition walls, etc.

(1) Lowest possible head conductivity (heat conductivity figure); laboratory figure not to exceed 0.06 kcal/mh °C.

(2) Minimum volumetric weight.

(3) Incombustible or very low flammability.

(4) Nondecaying [rot-preventing].

(5) Nondeformability.

(6) Sufficient mechanical strength.

(7) Odorless.

(8) Must not influence the taste (when used in refrigeration hold).

(9) Seawater-proof.

(10) Harmless to object to be insulated.

(11) Must not attract parasites.

Description of Substances and Processing of Piatherm "N"

Description

The insulating substance called Piatherm is a rigidified artificial resin foam. It represents a formaldehyde-carbamide condensation product, which is made by adding foaming agents, using a hardening agent (moss structure).

Piatherm "N" (Figure 1) is used as room insulation for cabins, etc.; it is glued onto the surface to be insulated by means of large-surface wet-glueing agents; then it is covered with fiber glass, which contains a special double water-proof and elastic coat on a vinitex base.

DFP Plate (Pressure-proof Piatherm Plate)

Description

Flakes of Piatherm "N" are mixed with finely ground bitumen (grain size about 0.25 mm). The mixture ratio of bitumen to Piatherm "N" is 1:5 (Figure 2).

The mexed Piatherm flakes are pressed into a mold, which is then exposed to a temperature of about 100° C in a special kiln (moss structure).

Piatherm with Coating

Description

The insulating foam substance Piatherm "N" is provided with a triple coat of vinoflex-PC lacquer. The vinoflex-PC lacquer is composed of about 27% film forming agent (re-chlorinated polyvinylchloride, phthalic acid esters) and about 73% solvents (monochlorobenzene).

The molded pieces of coated Piatherm (Figure 3) are laid out in a lattice work and are glued satiated onto the foundation and to each other by means of a special glue on a vinoflex-PC lacquer base. This special glue also makes it possible to seal cutting edges so as to make them waterproof.

Piatherm in Perfol

Description

The insulating substance Piatherm "N" is dipped in Perfol and glued with Perfol glue. Perfol has a polyamide film which is made of caprolactam -- the raw material used for Perlon products.

These insulating packages are laid out in a lattice work and are pressed (Figure 4).

Vinidur Insulating Mats, Respectively, Ekadur

Description

The synthetic substance polyvinychloride is produced on the basis of coal and limestone. It is a white powder (PCU powder). This powder is the initial product of the films formed under heat and pressure. The ;leated and latticed glue lamina make up the Vinidur insulating mats (Figure 5). The Vinidur insulating mats are laid out in a lattice work under pressure.

Alfol

Description

Pure aluminum (99.85%), rolled into foil, is called Alfol. The most common thicknesses of these foils are 0.04, 0.07, 0.10, and 0.12 mm (Figure 6). The aluminum foil is laid out as "Knitteralfol" or "Planalfol" in the known manner.

We are not going to describe the processing or layout pattern for the substances of Group II.

Ekazell "H"

Description

The synthetic substance polyvinylchloride is produced on a base of coal and limestone. It is a white powder (PCU powder). The production of Ekazell "H" is made possible by the addition of glass-separating propellant agents to the PCU powder (Figure 7). In tightly closed mold, we then get densified plates under heat and pressur treatment; these plates then expand into the light Ekazell "H" (cell structure) due to the cell overpressure in a hot water bath.

Foam Glass

Description

Foam glass (Figure 8) is a purely inorganic product. It consists of pure glass without any additions. The structure is more cell-like, rather than porous, since the pore wall itself is made up of cells.

III. Noise Control in Shipbuilding

In recent years there has been much talk about there being too much noise in shipbuilding; in this connection we heard such terms as noise level, sound intensity, and noise in general.

We can see how difficult it is to judge a certain noise by looking at a brief explanation of the terms noise level, sound intensity, loudness, and noise.

The noise level is the physical measure. The term noise level defines the 10-fold logarithm of the ratio of existing sound energy density to a normed [standard] reference figure. The noise level can easily be measured via the sound pressure and is given in "decibels" (db).

Sound intensity is a subjective measure and tells us how loud a noise is. This takes into consideration the human ear which does not pick up noises of equal energy density but of differing frequency composition as equally loud. Sound intensity is given in "phon."

Loudness is also a subjective measure. It differs qualitatively from sound intensity by the fact that the m-fold value of a certain loudness will also be picked up m-times as loud.

But this is not the case with sound intensity. An increase or decrease in a noise by 10 phon corresponds about to a doubling or halving of the loudness perceived.

Measuring equipment has been developed for the flawless measurement of the noise level, sound intensity, and loudness figures of a noise; but it would never be a useless undertaking if one wanted to develop a device that can measure noise; for noise is everything that irritates us acoustically; and here we run into a problem: the engineer uses the engine noises to tell how the engines are running; but the radio operator or the passenger is irritated by the engine noises.

The sound intensity reduction in engine rooms of ships today has a more serious undertone; it is not a matter of determining whether this engine noise is annoying or not. The important thing is to prevent damage due to noise.

In the past decade, the desire to increase ship speeds while maintaining constant cargo load led to the development of more efficient diesel engines. This capacity increase was often achieved at the price of more rpm and a heavier charge [load].

The weight of the engines, relative to the output, was reduced considerably. The engine room was reduced in size and it now contains more apparatus than before. This led to a general increase in sound intensity on ships. The sound intensities in the engine rooms in many cases exceeded the "health and safety" limits.

It is taken for certain that 110 phon are damaging to health. At first, the person concerned will not detect any damage to his

hearing. Initially, the hearing impairment does not cover the frequency range of human speech; rather, it lies between 3,000 and 6,000 cps, the so-called c_5 -Lenke and also has a deafening character, i.e., the deafening recedes after a few hours. But after several years, lasting hearing defects develop; they increase rapidly and can lead to total deafness. Hearing damage due to noise cannot be repaired. The lack of vocal communication isolates a deaf person much more from his environment than a blind person.

But noise can cause not only hearing defects; noise has an effect on the vegetative nervous system, which controls the heart frequency, the intestinal and kidney activities, etc. Noise is also a strain on the sleeping or resting person.

Last but not least, we ought to state that noise can cause accidents and that safety is reduced when acoustic signals are not heard.

More detailed investigations on the damaging effect of noises revealed that not only the sound intensity, but also the frequency composition of a noise is of importance.

Known evaluation lines are the evaluation lines by Meister. These lines represent the sound disturbance on the basis of measured disturbance magnitudes, taking into consideration the normal adaptation of the ear. The diagram of Slavin furthermore shows the sound intensities permissible in production.

In both cases it must be realized that the permissible overall sound intensity of a noise with a great sound intensity portion is much less damaging than a high sound intensity proportion combined with high frequencies.

Prior to hiring, engine room personnel must be examined audiometrically, i.e., by the ear doctor; their sensitivity to damage due to noise must be determined. In this manner we can take preventive action and transfer these people to less noisy divisions, thus preventing greater damage. The examinations must be repeated every two years, so that hearing impairment due to noise can be detected in its early stages.

Care must be taken that personnel in engine rooms with sound intensities of over 100 phon is made to wear "selectons," i.e., hearing protection devices, which are to be fitted by the doctor. The "selectons" are to be furnished free of charge.

It is furthermore important that hearing damage due to noise be listed as occupational disease and recognized as such.

In engine rooms, we must lower the sound intensity at least to 100 phon. This requirement is quite justified in view of the above reasons of personnel health preservation.

The sound intensity must be reduced to 60-65 phon in dining rooms, day rooms, living quarters, and rooms needed for the navigation of the ship. Sound intensity reduction can be achieved at reasonable cost for rooms which are not in the immediate proximity of the engine room.

To get an idea of the sound intensity distribution on ships, let us briefly look at the principal noise sources.

These are the main engines, the auxiliary engines, ship shafts [waves], screws, and ventilators.

Diesel engines essentially generate ignition, percussion, bearing, and exhaust noises. In case of supercharged engines, we also have air suction noises.

Imbalances in connection with shafts [waves] cause plates to irradiate sound energy via the bearings due to body sound propagation.

In the ventilators, noise develops due to eddy displacement along the scoops; this often leads to very intense and unpleasant noises due to unsuitable shape and improper interval.

Ship's screws throw water masses against the outer skin of the ship.

A promising sound intensity reduction can be achieved only through the systematic use of suitable sound proofing measures.

Sound proofing measures must be taken into account during the design phase. Subsequent measures call for expensive alterations and mostly fail to produce the desired effect.

In designing, for instance, an engine room, we must know which noise generators will be installed and which sound energy will be irradicated by them in the room with frequency spectrums. Taking into account the size of the engine room and assuming an average degree of absorption of the room surface, we roughly can determine from this the sound intensity to be expected. Likewise, the noise peaks can be identified from the frequency spectrums. Our first concern is to bring noise peaks under control, since they determine the sound intensity level.

Accordingly, the first thing to do is to make sound intensity and noise level measurements with frequency analyses on the main engines, the auxiliary engines, the gears, and other aggregates; from this we must then determine the sound intensities to be expected, taking into consideration the conditions under which the various engines and equipment items are installed in the ship.

On the basis of sound intensity and frequency analysis, we can determine the sound proofing measures. The sound insulation to be built in must not hinder the engine room personnel and interfere with the functioning of the aggregates.

The scope of the sound proofing measures must be determined in accordance with the required sound intensity reduction, taking into consideration the economically feasible costs; if the desired sound intensity reduction cannot be achieved through structural measures, it must be determined on the basis of the existing possibilities.

The measurements and other investigations must lead to justified sound proofing measures whose expected success must be given in numerical form in advance.

In conclusion, we ought to say the following on the subject of noise control in shipbuilding: efforts are under way in the German Democratic Republic to check the engines and aggregates, which are to be accepted by the DSRK, also for their noise level; and the sound intensity generated by the engines must be listed in the acceptance papers for these installations.

This will be the first step in controlling noise by installing sound proofing at the source of the noise.

I hope my presentation has given you an idea of the problems of insulation in shipbuilding. The problems outlined here can be solved only if we have even closer cooperation between refrigeration engineers and insulation engineers, which in the final analysis must end in a socialist cooperative.

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East Germany CSO: 4859

PROBLEMS OF ESTABLISHING PRICES IN SHIPBUILDING

/Following is a translation of an article by graduate economist K. Reiher, Berlin, and shipbuilding engineer A. Koester, Rostock, in the German-language periodical Schiffbautechnik (Shipbuilding Technology), Berlin, Vol. X, No. 9, September 1960, pages 466-471./

This article is intended to explain the possibility of and need for standard fixed prices (partial fixed prices /or: fixed prices on parts/) in shipbuilding. The authors are against the kind of attitude which concludes from the fluctuating operating costs in shipbuilding that we cannot determine the socially needed prime /operating and production/ costs in shipbuilding and that consequently the prices can only be built on the individual prime /operating and production/ costs.

The article starts from the consideration that the peculiarities of shipbuilding occur in a similar form also in other industries, but that these other industries do not refrain from setting up their own uniform fixed prices. The shipbuilding industry must therefore exploit the experience of other industries as regards the establishment of uniform fixed prices, or partial fixed prices /fixed parts prices/, without neglecting the special factors inherent in shipbuilding. Price establishment in shipbuilding cannot cover the entire ship as a whole but must be handled in the following manner: the ship must be subdivided into sections of partial components; the socially necessary prime or production costs must then be determined for these parts or sections, and a uniform fixed price must then be established. From the addition of the prices for the ship components or sections, we then get the total price for the ship (partial fixed price system), to which we must also add the prices for cooperation /cooperative work with other plants/.

The article discusses the method developed by the "Shipbuilding" Committee for the determination of the socially necessary prime or production costs and illustrates the system according to which the price of a ship is established. The article furthermore goes into the problems still to be solved in the development of a price system for the shipbuilding industry.

I. Need for Uniform Fixed Prices (Partial Fixed Prices) in Shipbuilding

One of the tasks of price establishment consists in creating uniform fixed prices (partial fixed prices) for the predominant portion of the goods production in the German Democratic Republic in order to support the solution of the major national economy tasks through an orderly socialist price system.

The uniform fixed price (partial fixed price) is based on the utilization of the value as social category, i.e., in contrast to the calculation price and the fixed price of the individual enterprise, it expresses the social production conditions, not the conditions in each individual plant. As far as the costs are concerned, this means that the uniform fixed price -- in contrast to the other price forms, which contain the individual operating costs of the plant -- is based on the socially necessary prime costs [See Note]. (Note: Let us note the following here. The price is based on the value; but the starting point of price establishment must be the prime cost, since the value cannot be directly expressed in the form of a quantity, but can be determined only approximately via the determination of the prime or operating and production costs.)

This fact gives us the following advantages if we apply a uniform fixed price for the work of the plants.

1. The uniform fixed price is of great significance in the implementation of economic accounting in the socialist enterprises. With its help, we can exert a major effect on the reduction of the work expenditure per product, since only the socially necessary expenditures are recognized through the price.

2. The uniform fixed price is necessary for the measurement and for the comparison of the prime costs and of the profitability of products and enterprises.

3. The uniform fixed price is necessary for plan preparation, plan accounting, and national-economy balance sheet preparation, since the uniform fixed price is built on the socially necessary prime costs and remains stable over longer periods of time.

The further development of uniform fixed prices (partial fixed prices) is often greatly hindered by the difficulties involving the comparability of products and their elements, the lack of reference materials on costs, and other things. In addition, we have the fact that the difficulties are aggravated and that we then draw the conclusion that it is impractical or impossible to set up uniform fixed prices. This leads to a situation in which it becomes increasingly difficult to spot and eliminate shortcomings in the particular production.

Such a trend exists also in price establishment in shipbuilding, where the prices are determined by each individual yard according to the valid price regulation and directives. Price

Regulation 1212 (See Note), is an expression of this. The theoretical foundation for such price establishment on an individual yard basis is to be sought in the fact that we emphasize peculiarities in shipbuilding and the resultant difficulties in the comparability of ships, in order to arrive at the conclusion that it is impossible to determine the socially necessary work expenditure in shipbuilding.

(/Note:/ Calculation Regulation of Price Establishment in the People-owned Shipbuilding Industry of 25 August 1958. The price regulation fixes the following calculation scheme:

1. Basic material
   (a) plant-owned basic material
   (b) deliveries and services supplied by other enterprises
2. Hours put in (advance hours at accounting rate)
3. Costs to be accounted for directly.
4. Enterprise price.
5. Production tax.
6. Industry sales price.

The calculation scheme distinguishes between the expenditures of the particular enterprise and expenditures of other enterprises.)

In an article in the magazine Wirtschaftswissenschaft /Economic Science/ (entitled "On Price Establishment for Shipbuilding Products," No. 7, 1957, page 1008), H. Luck advances the opinion that the peculiearities and difficulties inherent in shipbuilding are the primary factors in the establishment of the fixed price. Discussing the effect of the peculiearities of shipbuilding on the establishment of uniform fixed prices, Luck writes the following.

"As a result of this, we do not find it possible -- as we can do in other industries -- to calculate the average plan prime costs as basis of the fixed prices."

In his article, Luck arrives at the conclusion that the best thing to do is to calculate by using the method of the hourly computation rate (this method is contained in Price Regulation 1212); this method creates prices which are based on the individual expenditure of the shipyard and which permit comparisons of prime costs and profitability to an extremely limited extent (See Note).

(/Note:/ This applies in this context also to the method of relation-price /relative-price/ establishment on the prime costs of the first ship; Luck mentions this method also. This method shows plan deviations exactly as in the case of the hourly accounting rate method, but this is always related to the particular value.)

Of course, Luck sees other ways of price establishment (prices for standardized partial services); but he does not deem them acceptable for shipbuilding, so that he does not believe in the possibility of uniform fixed prices. He is not alone in this opinion.

One thing is certain: in principle, the establishment of uniform fixed prices is possible and necessary in all industries and the shipbuilding industry is no exception.

The importance of the shipbuilding industry calls for a system of price fixing which is based on the socially necessary prime [operating] costs. It offers the enterprises and the government guidance agencies a good opportunity to make enterprise comparisons and to exert an good effect on the improvement of the work of the enterprises.

If there are peculiarities inherent in shipbuilding, they must be given consideration. We must then develop the kinds of methods which allow for such factors. The way to fixed price establishment via fixed prices on standardized partial services is entirely possible in shipbuilding. Of course, this requires a by no means inconsiderable work expenditure and allround support. But it would harm the development of shipbuilding industry if, as a result of over-emphasis on peculiarities, we were to deprive ourselves of the possibility of analyzing and improving the work of our shipbuilding industry by looking at the effect of the uniform fixed prices.

II. The Way to The Creation of Uniform Fixed Prices in Shipbuilding

1. Effect of Peculiarities on the Methodology of Fixed Price Establishment in Shipbuilding

To arrive at a methodology for the development of fixed prices in shipbuilding, it is necessary to determine which peculiarities exist in shipbuilding, how great their effect is, and whether and how this effect must be considered in price establishment. As one of the peculiarities which has an effect in shipbuilding we have the fact that the shipyards specialize in the production of certain ship types. For instance, the Warnow Shipyard VEB, Warnemuende, makes larger motor freighters and coal and ore freighter; the Mathias-Thesen Shipyard VEB, Wismar, makes ocean-going andinland passenger vessels; the "Neptun" Shipyard VEB in Rostock makes medium freighters; the Stralsund People's Shipyard VEB specializes in fishing vessels. In addition, we have the inland shipyards which have a greatly varied building program.

From the specialization of the shipyards in various ship types and the resultant comparability of ships as a whole, we draw the conclusion that it is hardly possible to determine the socially necessary work expenditure for ships.

The point of departure for such a consideration lies in the fact that -- when a special useful value (ship type) is produced only in one enterprise (shipyard) -- we say that the work expenditures of this enterprise are the socially necessary expenditures for the production of the particular product.

The error in this consideration lies in the fact that we relate the value determination of the products of an industry to much to a single specific product on the basis of the socially

necessary expenditures of the particular industry; this is so because we see the products only as a whole and because this superficial examination does not give us any comparability between products.

In this connection, we forget that we have this kind of enterprise specialization not just in the shipbuilding industry; on the contrary, we have a general tendency toward specialization in production which is intended to increase labor productivity. As a result of this, we find that the production of identical products in different plants is eliminated to a great extent. In the case of production instruments, e.g., there are only a few cases where a certain product is turned out in several plants at the same time. According to the thesis spelled out above, this would mean in the final analysis that, as specialization increases, we must more and more go back to individual enterprise expenditures in the process of price establishment, since there will be less and less products which are produced by several plants at the same time. In this respect, too, we can see the error in such an assertion.

How then must specialized production be taken into consideration in price establishment? The various enterprises in the various industries do not generally turn out identical products; it is therefore necessary, in pinning down the value formation processes, to subdivide the products enough, so that we can make a comparison between the various specific products; this in turn should enable us to determine the level of the socially necessary work expenditure for these parts.

The just described peculiarity of shipbuilding and its effect on price fixing is a problem which is quite widespread in the national economy. We must realize that the individual ships to be compared in the shipbuilding industry differ greatly.

Here is another problem that has been termed a peculiarity in shipbuilding. This problem consists in the fact that ships in a small lot or series (See Note) can be different; that is to say, changes are made in the individual ships. The reason for this can be the greater development of technical knowledge in shipbuilding and the special desires of the customer. This undoubtedly makes it difficult to make comparisons of ships as a whole.

([Note:] In shipbuilding we use the term series instead of small lots to indicate the fact that the successively produced ships differ.)

Here too we must go back to the parts of the ship if we are going to make a comparison. Besides, changes in the series or sequence can also occur in other industries; of course, the variants within a series or sequence have greater scope in the case of the ship. This has the effect that we reach the limits of comparability in some ship parts.

In this connection we must furthermore consider the fact that a so-called entrance or contact curve develops in small-lot or

series production which expresses the drop in the cost per ship as the number of units increases. The curve initially is steep; when the number of units is large, it approaches a straight line (See Note). From the curve we can read off the ship at which the optimum cost level is reached. From this point on, the small lot or series no longer basically affects the prime cost reduction. This trend must not be confused with the development of the costs as regards to lot size, since a small lot or series in shipbuilding involves the successively repeated production of a ship type.

(/Note:/ An example is shown by the curce in Figure 1.)

An argument which is directed against the establishment of uniform fixed prices in shipbuilding is the argument of the high share of cooperation in shipbuilding. From this we draw the conclusion that the shipyards can influence the value formation process only to a certain extent. The prices for the services of other industries would be co-determinant in the price establishment in the shipbuilding industry, without the shipbuilding industry having a chance to exert any influence on this.

It is true that the scope and structure of the yards lead to a great degree of inter-yard cooperation. The share of the enterprise building costs of the shipyards is mostly between 40 and 50% as regards the total prime costs; but it must be noted that there are other industries with high proportions of cooperative efforts. In this problem we must remember that the greatest portion of the goods production is regulated by uniform fixed prices, The prices for outside services are then incorporated into the calculations of the shipyards as uniform fixed price. In this respect, there must be no fluctuations in the prime costs of the yards when the outside services remain constant.

Since we will continue to have prices which are based on the operating and production costs /prime costs/ of the individual enterprises, there can be changes in the operating and production costs for which the yards are not co-responsible. The scope of these prices and hence their range of effectiveness would seem to be relatively low on the basis of the great share of the uniform fixed prices. Unfortunately, we can detect a trend in the direction that new designs and hence new products are often used though they are not necessary. (This is not intended to reflect on the really justified new designs.) We do not always set up fixed prices for these new designs and products; therefore, the proportion of the prices based on individual enterprise costs will increase. Such a limitation must not be bring about a negative evaluation of the cooperative efforts toward fixed price establishment in shipbuilding. This problem also exists in other industries, without there being any need to do without the establishment of uniform fixed prices there . The effect of cooperation becomes noticeable in price fixing in shipbuilding where we have a very great proportion of prices for cooperative service in the price system which is to be newly set up.

From the preceding statements, we can see that there are certain factors in shipbuilding which influence the establishment of uniform fixed prices. This influence has the effect that it is not possible, on the basis of the socially necessary prime costs, to create a uniform fixed price for all ships as a whole. On the other hand, it is possible to determine the socially necessary prime costs for individually comparable structural elements and to fix the prices. By adding the prices of the individual structural elements in accordance with the building-stone principle, we can compose the corresponding price for the individual ship. The prices will vary for the individual ships, since each ship will reveal differences. In this connection we cannot avoid including in the ship's price the prices for the special ship parts which occur only in the one particular ship. The price establishment for such parts would have to be determined in relation to the costs or comparable products.

2. The Methodology of Price Establishment in Shipbuilding

In the establishment of partial fixed prices in shipbuilding, the committee is using the Einheitsbaugruppenverzeichnis fuer den Schiffbau der Deutschen Demokratischen Republik /Standard Assembly List for Shipbuilding in the German Democratic Republic/. This Standard Assembly List of course needs to be revised; but it was an important reference source in price development since it defines a uniform system for shipbuilding. This uniform system is needed in order to be able to pin down the numerical material and to be able to use it.

The standard assembly list categorizes shipbuilding into nine main groups:

(1) hull
(2) equipment
(3) furnishings and wooden parts
(4) boilers
(5) main engines
(6) auxiliary machinery and apparatus
(7) piping
(8) electrical equipment
(9) general preparatory /prefabrication/ and production work.

The individual main assembly groups are further subdivided into groups and subgroups.

Within main assembly group 1 we have the following breakdown into assembly groups (with minor deviations). Each assembly group has its own price list.

Price list 1: outer skin, joints, double bottoms
Price list 2: bulkheads, shaft tunnel, walls inside the ship
Price list 3: main deck and decks below main deck
Price list 4: shafts and hatches

Price list 5: foundations
Price list 6: decks above main deck
Price list 7: walls above main deck and deckhouse
Price list 8: hull (excluding deckhouse) at inland shipyards

For each assembly group or subgroup, we can read off a gradation of the given indexes according to weight in t or kg per sq m or $\frac{kg}{sq\ m} \cdot \delta$ with the pertinent material value. The material, we use here to start with is MSt 4s steel. If we use other steels (e.g., 09 G 2), these are to be calculated as surcharge. Furthermore, each assembly group contains data on hours -- graduated according to indexes -- which must be multiplied by an hourly accounting rate. Thus each assembly group contains data on material, hours, wages, general expenses, and profit (the latter three elements are contained in the hourly accounting rate); all of this together gives us the price. The price does not contain the design costs, costs for tightness tests, and the costs for the corresponding services, which are listed in main assembly group 9. Here is an example for this complex. (The numbers are assumed figures; the intermediate values must be interpolated.)

Main assembly group 11: outer skin, joints, and double floors
Assembly groups 111-118: posts, outer skin, stringers, double floors, bulwark and other structural parts

Data for determination of index:

L = length between perpendiculars
H = depth up to topmost through-deck
δ = block coefficient

Index[1]	Material costs DM/t	Hours per t	Hourly accounting rate	Price DM/t
200	600,-	180	5.65	1617,-
240	600,-	175	5.65	1589,-
280	600,-	170	5.65	1561,-
320	555,-	165	5.65	1487,-
360	555,-	160	5.65	1459,-
400	555,-	155	5.65	1431,-
usw.				

1) The indexes given in sq m are obtained from L x H.

In this manner, it is possible to determine the socially necessary prime costs for the assembly groups and for the assembly subgroups and the establishment of partial fixed prices.

In the determination and compilation of the numerical material, we run into difficulties, inasmuch as the standard assembly subgroups and the establishment of partial fixed prices.

In the determination and compilation of the numerical material, we run into difficulties, inasmuch as the standard assembly subgroup list is not generally taken into consideration in all shipyards during technological accounting. For this reason, the values could in many cases be determined only under great difficulties. In addition, we have the fact that various shipyards varied the content of the assembly subgroup list according to certain peculiar features of their production process, of their planning, and of their accounting.

Once the process of fixed-price establishment has been completed, the yards will be forced to break down the technological accounting according to the principle of the assembly subgroup list. This will enable the yards to analyze the enterprise expenditures much better via comparisons to other enterprises than they were able to do in the past and it will make it possible for them to eliminate shortcomings that might crop up.

The partial fixed prices and the attendant subdivision also give the management organs an opportunity to get a better picture of what really goes on in the enterprise and to manage the latter better.

The Shipbuilding Committee compiled the yard figures according to the described methodology and worked out values for main assembly group 1, hulls. In this process it was guided by the fact that one cannot start from the values of the first ships in a series or lot built today. The construction of the first ships of a series or lot often dates some years back; but the work of the yards has improved considerably since then. The better work of the yards is also noticeable in the cost reduction, which arises as a result of the increasing unit number in the production of some ship types.

The values thus determined will of course be changed in some respects before they can meet the requirements of price establishment, but one can take them as the foundation for the further development of prices and as confirmation for the fact that the way chosen is feasible.

The table below shows by way of example the percentage-wise development of the hours for various ship types over several years. The basis of the calculation (equal to 100%) are the values worked out by the committee in comparison to the effective numbers of the re-calculation.

Number of ships	Hours							
	Ship Type A		Ship Type B		Ship Type C		Ship Type D	
	Year	%	Year	%	Year	%	Year	%
1st ship	1956	147	1957	172	1957	127	1958	121
2nd ship		145		163		123	1958	119
3rd ship		141	1958	139		119		
4th ship		136		132		115		
5th ship	1957	123		121	1958	113		
6th ship		122		114		112		
7th ship		110	1959	111		106		
8th ship	1958	102		105		100		
9th ship		93				101		
10th ship	1959	88						

One problem in working out the price setup consisted in the differing shapes (coefficient of fineness of the hull) and the attendant differentiated high work expenditure. The shaping differs between ocean-going freighters and inland freighters; it differs in ocean-going freighters and ocean-going passenger vessels; it also differs between inland passenger vessels and inland freighters. As the degree of shaping increases, the prime costs increase. This fact is taken into consideration in the new price proposals; the coefficient of fineness was inserted as coefficient in price lists 1 and 8. Furthermore, price list 3 -- main decks and decks under then main deck -- is differentiated according to freighters and fishing, passenger, and other special ships.

3. Special Problems

In this section we are going to go point out some special problems which partly involve the entire price establishment procedure in shipbuilding and which partly are confined only to main assembly group 1, hulls.

Here are these problems.

(1) The problem of evaluating the hours.

(2) The problem of the volume section construction method in the inland shipyards.

(3) The problem of the differentiation of prices by number of units.

Problem 1

The available price lists indicate that the hours are multiplied by an average hourly accounting rate. But this is inaccurate, since the hourly accounting rates, from which the average hourly accounting rate is formed:

(a) are outdated; they were calculated in connection with Price Regulation 1212 (See Note);

(/Note:/ Price Regulation 1212 has the following hourly accounting rates

(Warnow Shipyard VEB, Warnemuende	6.70 DM
("Neptun" Shipyard VEBm, Rostock	5.65 DM
(Mathias-These Shipyard, Wismar	5.65 DM
(Stralsund People's Shipyard VEB	5.65 DM
(Inland shipyards	5.38, resp. 3.39 DM.)

(b) The hourly accounting rates refer to the yard as a whole and not to the individual main assembly groups. This makes it difficult to make comparisons between wage and general costs. The accounting rates valid so far were set up on the basis of the average wage group of the yards. In addition we had the indirect general costs of the yards and certain profit items. Thus we got hourly accounting rates which take into consideration the differing equipment and structure of the yards.

(c) The hourly accounting rates were worked out from viewpoints other than those needed in the current version.

It is therefore necessary to deviate from the current average hourly accounting rate. What then are the possibilities? One determine an average wage rate at least for one main assembly group on the basis of the wage group branch catalog. We would have to proceed similarly in the case of the general costs. It does not seem practicable to have an even greater breakdown in the formation of rates into main assembly groups, since this would require too much of an effort, although it would be more accurate as regards the comparisons.

We can furthermore set up new hourly accounting rates for main assembly groups or we can create a different unit. This form is easier to handle than the form we just mentioned. It is somewhat limited in regard to the things it tells us, since wage and general costs are combined in one rate. For the previously mentioned reason, it is not proper to make a further breakdown of the hourly accounting rate here either. In order to not make the methodology too complicated, it is however recommended that this form be used in price establishment in the shipbuilding industry.

Both in the application of separate rates and in hourly accounting rates, we are to a certain extent considering the factor that the medium and small yards work with large numbers of hours and with lower wage brackets and general costs than the big yards. This is because the hourly accounting rates to be determined in advance will be higher than those of the small and medium yards; this in turn will be due to the high share of the big yards in the total production output of the shipbuilding industry. The greater number of hours of the small and medium yards is partly balanced out by the higher rates which are to be used in the calculation.

Problem 2

The inland yards use mostly the volume section construction methods /See Note/ and use assembly group 18, section construction, for their accounting. Thus the inland yards do not have the kind of subdivided system we described earlier. Besides, it is not practical to introduce such a subdivided system in the inland yards, if we look at the share of the inland yards in the shipbuilding output and at the size of the inland yards and the resultant work expenditure. (Note: A volume section comprises parts of several assembly groups. The fore body can for instance be a volume section.)

In order to set up the price regulations so that every yard will have a chance to work out the price according to the construction and accounting methods of the yards and in order to create an over-all comparison possibility between ocean and inland shipyards, it is necessary to work out a price list for assembly group 18, section construction, to which will correspond assembly groups 11-15 (price lists 1-5). By adding assembly groups 11-15 and comparing them to assembly group 18, we can make an over-all comparison. The assembly group called section construction must likewise be differentiated according to the shape.

This kind of special consideration of the inland yards is undoubtedly a disadvantage; but it cannot be avoided without a considerably higher work expenditure in the inland yards.

Problem 3

A further problem to be considered in price establishment in shipbuilding is the problem of price differentiation of ships by number of units. The cost documents tell us that the costs drop as the unit numbers increase; however, the cost decrease is not proportional to the number of units. Starting at a certain point, the cost reduction will be niminal. This is partly due to the fact that most of the yards have only just begun the large-scale production of ships and first had to gather experience. Such high cost reductions will not appear in the future, since a certain standard degree of labor productivity has been achieved. Nevertheless, we will always find a cost reduction as the number of units increases, since lessons will always be learned in the first ships of a lot or series and this in turn will be expressed in the costs (we are not considering here the fact that the ships within a lot or series can be altered).

The new price guide lines must allow for this effect on the cost level of the ships. Depending on whether we base our price establishment on the costs of the first ship or of the ship as of which the costs decrease but little as the unit number increases, it will then be necessary to grant price cuts or increases, or both.

In this connection it must be determined how great such a gradation should be. In the first ships, it will have to be rather tight, since the cost differences from one ship to the next are considerable here. As the number of units increases, the range can be expanded. An incorrect gradation of surcharges and rebates will have a negative effect on the profitability of the yards.

Such deliberations and considerations emerge when one analyzes the cost development of various ship types, which results from the increase in the number of units. If we for instance look at the development of the hours involved in 15 ships of a certain lot or series, we can clearly establish the trend that the decrease in the hours in the first ships is greatest and that it becomes smaller as the unit number increases (Figure 1). (In this example, we must remember that the number of hours is not corrected when we make technological changes in the ships; since they are this is so because these are minor changes which do not basically influence the picture.)

The gradation of prices by numbers of units results in differing prices for the same product. (Here we are not considering the fact that changes in the ship type within a lot or series also lead to differing prices, since this does not touch on our problem.) If we were to allow this price differentiation to exert an effect on the customer, this would have negative results, since the customer of course would not want to buy the first ships which are comparatively much more expensive than ships built later. It is therefore advisable to fix a uniform sales price, related to the price differentiation based on the number of units.

Though the work done so far by the committee involved only main assembly group 1, prepared the way for main assembly group 2, and tackled the problem of the over-all system of price establishment in shipbuilding, we find that the results of this work -- despite all difficulties and the problems still to be solved (both as regards main assembly group 1 and the other main assembly groups) -- show that we can set up a price system in the shipbuilding industry which will in principle be based on the socially necessary prime costs. The developments hitherto in shipbuilding makes this possible because the further growth of this industry makes such a price system a necessity. The system of price establishment in shipbuilding would have to look something like this.

(1) We determine fixed rates for material, hours, wages, profit, and general costs for the work done by the yards on the basis of assembly groups. The rates must be based on the socially necessary expenditure. Thus we get partial fixed prices for the assembly groups.

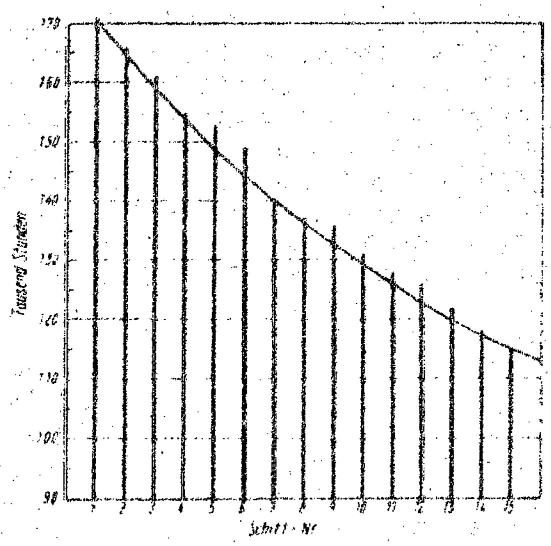
(2) For special ship parts, which occur only in a certain ship, it is necessary to establish prices in relation to the costs of comparable products; in this connection, proof must be furnished that such special parts are really needed in the ship.

(3) Services of other industries are included in the calculation at the IAP (industry sales price) as uniform fixed price, or as calculation price, or as fixed enterprise price. Cost fluctuations can occur only in those cooperative efforts for which we have no uniform fixed prices (under certain circumstances also when changes are made in the cooperative part).

Such a system of price establishment does not exist in this form in our economy. It is essentially based on the partial fixed prices and on the uniform fixed prices for cooperative services and efforts. The smallest portion is based on individual enterprise prices, so that the requirement for the establishment of the prices on the basis of the socially necessary work expenditure is fulfilled in principle.

FIGURE APPENDIX

Thousand hours



Ship number

Figure 1. Example of a curve -- hours in 1958-1959 for 15 ships of a lot or series.

5058

East Germany

CSO: 4756

EAST GERMAN TRANSPORTATION DURING THE SEVEN-YEAR PLAN

/Following is a translation of articles from various issues of the German-language publication IWE - Informations - und Archivdienst (Information Bureau West-Information and Archive Service), Berlin./

A. TRANSPORTATION IN THE SEVEN-YEAR PLAN

No. XI/101/1959, 4 November 1959 Pages 1-3

Unsigned article

The law concerned with the Seven-Year Plan provides that goods transportation performance for the entire transportation system is to be increased by 140% by 1965 in comparison with 1958. Railroad goods performance during the same period is to increase by 124%, that of motor carriers by 156%, that of inland shipping by 153%. Ocean shipping is charged with transporting in excess of 4 million-ton cargo more in 1965 than in 1958. In 1958, transportation volumes and transportation performances of the individual transportation branches amounted to:

	Transportation volume in 1,000 tons	Transportation performance in million ton-km
Railroad	227,199	30,101
Inland Shipping	14,863	2,398
Ocean Shipping	593	3,738
Motor Carriers	226,535	4,147
Total	469,190	40,384

On the basis of the percentage increases prescribed in the law concerned with the Seven-Year Plan (see above), the following Plan figures are obtained for 1965:

	Transportation volume in 1,000 tons	Transportation performance in million ton-km
Railroad		37,325
Inland Shipping		3,669
Ocean Shipping	4,600	
Motor Carrier		6,469

The data for the total planned increase in transportation of goods by 140% do not permit accurate interpretation since it is not clear from the text of the law whether a planned increase in transportation volume or in transportation performance is involved. All considerations, however, point to the fact that a planned increase in performance is involved, which would result in the fact that in 1965 a total transportation performance of 56,534 million ton-kilometers (tkm) is to be attained.

Data concerning the planning of passenger traffic are not contained in the Seven-Year Plan law. The following performances were achieved in 1958 for passenger traffic:

	Passengers Moved in millions	Passenger-Movement performance in million passenger-km
Railroad	980	21,399
Inland Shipping	8	187
Motor Carriers	507	6,961

An analysis of the available data concerning transportation volume and performance in 1958 and according to Plan 1965 indicates that the railroads within the framework of the Seven-Year Plan are to provide the greatest increase in transportation performance in absolute values. The highest percentage growth quota, however, is to be borne by inland shipping and motor carriers. The tendency to utilize motor carriers predominantly within the framework of hort-haul transportation as feeder service for railroads and inland shipping will continue to remain. Already in 1958 railroads and motor carriers shared almost equally heavily in total transportation volume with shares of 48.4% and 48.3% respectively. In transportation performance the railroads were far ahead in first place in 1958 with 47.5%. Motor carriers accounted for only 10.3% of the total performance. These proportions show that motor carriers covered only relatively short distances, primarily in order to provide connections to reshipment points for other transportation carriers. If motor carrier performance of 1965 is to increase by 2,322 million tkm over 1958, it is justifiable to conclude that short-haul transportation will also account for the greatest share of motor-carrier traffic in the future. In a broader perspective, however, it may be counted upon that the tkm performance figure for motor carriers will rise suddenly when the ocean port of Rostock begins to process its first increased capacities, and especially when at the end of the Seven-Year Plan the Berlin-Rostock super-highway will be opened to traffic.

In the field of inland shipping, the increased transportation performance is to be achieved on the one hand by a continuation of the already begun reconstruction measures and on the other hand by

increasing the tonnage. Reconstruction involves the rebuilding of dump barges into self-propelled vessels, the introduction of line traffic on the waterways, the improvement of waterway-trafficability and constructions such as mechanization of locks, etc.

For passenger traffic in the Seven-Year Plan, ocean shipping and air transportation will also gain in significance in addition to the three classical transportation carriers; inland shipping, railroad and passenger motor carrier. The Seven-Year Plan law provides that one passenger ship for vacationers be placed in service during each of the years, 1960, 1961, 1962 and 1965. The first ship is the "Voelkerfreundschaft" ("People's Friendship") which initiates passenger traffic in 1960. The "Voelkerfreundschaft," formerly the "Stockholm," was purchased in 1959 from a Swedish shipping company. In 1961 the first ship for vacationers constructed in the DDR (Deutsche Demokratische Republik -- German Democratic Republic) is to be launched, a variation of the currently mass-produced ocean passenger ship of the Mathias-Thesen-Shipyard, which is exported to the Soviet Union.

(To be continued)

B. RAILROAD TRANSPORTATION

No. XI/102/1959, 5 November 1959 — Unsigned article
Pages 1-5

The following tasks are posed to railroad transportation by the Seven-Year Plan law:

1. Goods transportation performance is to increase 124% by 1965 in contrast to 1958, the rotation period of freight cars is to decrease by 7.5% and car loading is to rise by 7%.

2. From 1959-1965, 1,160 electric and diesel engines are to be provided to the railroads. 520 km of track are to be converted to electrical operation.

3. The existing freight-car pool is to be modernized. Some 16,000 new freight cars, primarily high-capacity cars with automatic unloading installations and special cars, are to be placed in operation.

4. 700 km of new track is to be laid. As a result of track construction, especially industrial centers as well as the ocean port Rostock are to be made more accessible to railroad transportation.

5. Traffic safety is to be increased by activation of 100 signal boxes, the use of the automatic section blockings on heavily travelled sections as well as by the installation of at least 1,000 stop-signal installation, half-gates and electrical call-signal gates.

The "Reichsbahn" (German National Railway) currently has at its disposal a railroad network with an operating road length of 16,093 km. By 1965 the operating road length will be approximately 16,800 km. The greatest line increase will result in the "German National Railway" zones Berlin, Greifswald and Schwerin, where construction for expansion of the line network was begun as early as 1958, especially in improving the transportation connections with Rostock. Currently construction is in progress on the Lalendorf-Neustrelitz line, which is a dual-track installation, and at the port railroad station as well as on the local supply lines to the port railroad station.

The lines electrified since 1952 possess a total length of 200 km at this time. The first electrically operated line, Halle-Kothen, was put into operation in 1955 after a 3-year construction period. In the ensuing years the northern freight belt from Leipzig and the lines Leipzig-Dessau and Kothen-Leipzig were electrified. Presently the line sections Halle-Weissenfels and Merseburg-Mucheln are under reconstruction. Electrical railraod operation is to begin on 20 December 1959 on this 50-km long railroad line. The perspective plan of the "German National Railway" originally provided for electrification of 435-km track by 1965. In the law concerning the Seven-Year Plan the distance

was raised by nearly 100 km after the relationships among railroad hauling output with steam, diesel and electric engines had been established anew. In June 1959 it was still planned to transport 79% of the hauling output with steam engines and 21% with diesel engines and electric engines by 1965. On the basis of the possibilities of equipping the "German National Railway" with new diesel and electric engines from self-produced sources, new percentages were established in September 1959. Accordingly by 1965 13% of the hauling output is to be provided by electric engines and 12.5% by diesel engines, thus a total of 25.5% instead of the earlier 21%. Beginning 1961 no new steam engines will be placed in operation by the "German National Railway".

Of great significance to railroad transportation in the coming years will be the transportation mastery of foreign trade. Whereas e.g. in 1957, 190 cars with steel and pig iron cross the borders of the DDR from the Soviet Union daily, according to preliminary estimates these will total 560 cars by 1965. Although the use of tank cars will drop as a result of the construction of the oil pipeline USSR-DDR, an increase in railroad transport volume due to foreign trade with the USSR by about 60-75% in comparison with 1957-58 must be counted on. The increased quota of foreign trade transport which the railroad will have to master amounts to 43% in comparison with 1958 in the case of Czechoslovakia, and around 19% in the case of the capitalist countries. In order to realize these higher transportation performances, the switching performances of border railroad yards are to be increased, or switching performances of border railroad yards are to be decreased and moved to other switching points, the railroad network is to be extended from the border to the principal processing centers and be modernized, and new border railroad yards are to be put into operation.

By 1965 more than double the amount of track as compared with 1958 is to be made available to the "German National Railway". The main lines are to be equipped in such a manner that speeds in excess of 120 km/hr will be possible. To improve and expedite freight traffic, especially to carry out door-to-door traffic, an extensive program for the introduction of container traffic is provided in the Seven-Year Plan. Among others, more than 30,000 containers and approximately the same number of folding crates are to be provided. Moreover, reconstruction and modernization of old and the construction of new freight cars is one of the most important plan objectives. Emphasis is on high-capacity and special freight cars of light-weight construction, taking into consideration requirements of the chemical program, and the construction of freight cars for special goods from and to the Soviet Union, equipped with track-interchangeable wheel sets (recently tested for the first time) in order to render possible direct transportation without reloading.

In the field of passenger train traffic the establishment of express connections between Berlin and principal district cities and the reconstruction or modernization of the most important passenger stations as e.g. the Leipzig main station and stations Berlin-Ostbahnhof (Berlin-East), Berlin-Alexanderplatz, Cottbus, Dresden and Magdeburg are planned for. By 1965 the "German National Railway" is to receive 1,900 modern passenger-car units, especially double-deck units, self-propelled cars and rapid-transit units. An additional 3,000 older car units are to be modernized, whereby only the old carriage is to be reused.

The Berlin subway system which is under the direction of the "German National Railway" Berlin, is to receive 28 new complete trains in the course of the Seven-Year Plan. In addition, the safety installations are to be considerably improved so that e.g. on the main line Friedrichstrasse-Ostbahnhof [Friedrich Street - East Station] the train intervals can be decreased from 150 seconds currently to 90 seconds.

Measures provided by the Seven-Year Plan law in the area of railroad transportation also call for extensive reconstruction of the production facilities of the "German National Railway", especially of the repair shops. According to proposals of the chief administration RAW in the Ministry for Transportation, the RAW "Wilhelm Pieck" in Chemnitz has already begun this year to convert to overhauling of diesel engines. The RAW Dessau is to specialize in 1960 in overhauling electric engines, which currently still repairs predominantly selfpropelled cars and diesel engines of low performance. After specialization of RAW Dessau in the repair of electric engines, the present functions of this operation will be transferred to the RAW Chemnitz (diesel engines) and to the RAW Wittenberge (self-propelled cars). Individual plants are also being extensively specialized for freight cars. The RAW Wittenberge, which hitherto overhauled engines and wooden cars with 2-3 axles, will repair in the future self-propelled cars taken over from RAW Dessau as well as double-deck cars and double-deck articulated trains. For repair of self-propelled cars and light-weight cars special installations and equipment are currently being installed in this plant. By 1963 the reconstruction of RAW Wittenberge is to be completed. The plant will then be the most modern RAW of the DDR.

Since in the future significantly more 4-axle freight cars must be taken care of, specialization of a plant is necessary for overhaul of these car types. The chief administration of the RAW of the Ministry for Transportation has decided to entrust this function to RAW "7 October" in Zwickau. Beginning 1965 this plant will no longer repair steam engines, whose role will steadily decrease, but only 4-axle freight cars.

Since the machine-building industry is increasingly changing to the production of new parts only and manufactures spare parts only for current production, the RAW's are forced to produce a large share of the spare parts themselves during the Seven-Year Plan. Centralized operation for spare-part manufacture will be vested in the RAW Brandenburg-West which is already being equipped now with an electric steel foundry and other equipment. The RAW Magdeburg is also to be included in spare-part manufacture if this appears to be economically necessary.

(To be Continued)

C. OCEAN SHIPPING

No. XI/103/1959, 10 November 1959 Unsigned article
Pages 1-4

The DDR did not begin construction of its own ocean shipping facilities until 1954. On 13 October 1950 a steamer built prior to World War I and which had been reconditioned in 1949/50, was put into service under the name "Vorwarts" /"Forward"/. The DDR possesses a ship seaworthy in every respect only since 11 October 1954 when the "Rostock", a 4,500-ton (dead-weight) freighter was taken over by the People's Owned German Ocean Shipping Company in Rostock founded on 1 April 1952. The "Wismar" and the "Stralsund" (1,250 tons dead-weight) sisterships of the "Rostock" followed in 1954. All 3 ships in 1954 only called on Polish and Soviet ports. Since 1955 calls are also made at Finnish, Swedish, British, Albanian, Rumanian, Bulgarian and Egyptian ports as well as at Dutch and Belgian ports, and since 1956 also at Syrian, Lebanese, Turkish, Yugoslavian and French ports. By the end of 1955, 6 coastal motorboats especially built for Baltic- and North-Sea traffic were turned over to the German Ocean Shipping Company. In 1956 an additional 10 coastal motorboats followed. In 1957 the ocean fleet was expanded by activation of the freighter "Thalmann-Pionier" (4,050 tons-dead-weight). In the same year the Ocean Shipping Company also received the first large freighters of the 10,000-ton (dead-weight) class "Frieden" /"Peace"/ and "Freundschaft" /"Friendship"/ built at the Warnow-Shipyard. The merchant marine suffered its first loss during this year. On 8 February 1957 the "Stralsund", on a voyage to England with a load of potash, sank near the English coast.

In 1958 the merchant marine received its greatest capacity increase. The number of ships rose from 21 with 41,058 tons (dead-weight) at the beginning of 1958 to 33 with 144,000 tons (dead-weight) at the end of the year. During this year the following ships were activated: the 10,000-ton freighters "Berlin", "dresden" and "Magdeburg", sisterships of the "Frieden /"Peace"/ and "Freundschaft" /"Friendship"/; two motor tankers of approximately 11,000-tons (dead weight) each, "Leuna I" and "Leuna II" built in the Soviet Union; the 10,000-ton "Thomas Muntzer", "Heinrich Heine", and "Theodor Korner" purchased on the used tonnage market; and the 3,000-ton (dead-weight) steamer "Stubbenkammer". In 1959 the following ships purchased on the used tonnage market were added to the German Ocean Shipping Company fleet: the approximately 10,000-ton (dead-weight) freighter "Steckenpferd" /"Hobby Horse"/ and "Ernst Moritz Arndt" as well as the approximately 3,000-ton (dead-weight) motor ships "Cap Arcona" and "Stoltera". The 10,000-ton "Erfurt"

and "Leipzig", sisterships of the "Frieden ["Peace"] were added as newly built ships. In 1959 the Swedish ship "Stockholm" was purchased as the first passenger ship, which since 1960 is to travel as a ship for vacationers under the name of "Volkerfreundschaft" ["Friendship Among Nations"] bearing the flag of the German Ocean Shipping Company.

The ocean fleet is to be significantly expanded in the Seven-Year Plan. It is planned to add the following ship units to the German Ocean Shipping Company:

23 coastal motorboats of 760 ton (dead-weight) each, built by the Peene-Shipyards in Wolgast, to be delivered by the end of 1960.

3 - 10,000-ton tankers built by Leningrad shipyards, imported from the USSR, to be delivered by the end of 1960.

5 - 10,000-ton freighters, built by the Warnow-Shipyard, Warnemunde, sisterships of the "Frieden" ["Peace"], to be delivered by the end of 1960.

6 bulk-product freighters for coal, ore, grains etc. with 10,000 ton (dead-weight) each, built at the Warnow-Shipyard, delivery 1960/65.

11 freighters with steerage for piece goods with approximately 10,000-ton (dead-weight) each, built at the Warnow-Shipyard or Mathias-Thesen-Shipyard, Wismar, delivery 1960 to 1965.

3 freighters with continuous steerage capable of service as line freighters, of 10,000-ton (dead-weight) each, built at the Warnow-Shipyard, delivery 1960/65.

18 Freight motorboats of 1,600-ton (dead-weight) each as shelter deckers or 2,100-ton (dead-weight) as full scantling vessels, built at the Neptun-Shipyard, Rostock, delivery 1960 to 1965.

3 ocean passenger ships with a capacity of 400 to 340 passengers, built at the Mathias-Thesen-Shipyard, delivery 1 May 1961, 1 May 1962, and 1 January 1965.

At the end of 1960 the VEB German Ocean Shipping Company is to have a fleet capacity of 263,500 ton (dead-weight) according to the plans of the chief shipping administration of the Ministry for Transportation. At the end of the Seven-Year Plan a total of approximately 480,000-ton (dead-weight) fleet capacity is to be available.

In 1958 the VEB Deutrans or VEB German Shipping Brokers have freighted a total of approximately 2,699,400 tons. Of these the VEB German Ocean Shipping Company was able to assume only 489,000 tons (18.1%). Other socialist shipping companies were able to assume 546,100 tons, i.e. 20.3%. Capitalist shipping companies shipped 61.6% - 1,664,300 tons. The share of goods transported by

domestic tonnage is to increase considerably during the Seven-Year Plan. The merchant marine is to increase the transport of goods in tkm by 1965 by at least 303%.

Currently the VEB German Ocean Shipping Company maintains regular service to the Soviet Union, Albania, UAR, Finland and the Benelux countries. The remaining shipping connections consist of tramp shipping. At the meeting of ocean shippers of participating countries of the council for mutual economic aid in Bukarest on 20-28 February 1959, the establishment of new services by the Soviet Union, Poland, Bulgaria, Rumania and Czechoslovakia was voiced. It was agreed to cooperate closely in establishing services to avoid overlapping as much as possible. The total available capacities in the satellite countries are to be utilized to the fullest possible extent. Under these conditions the DDR will undertake the establishment of service by 1965 as follows:

1. Sweden;
2. Norway, with service to ports in Iseland and Danish ports;
3. England, with service to Irish ports;
4. West Africa, with possible service to Spanish and Portuguese ports;
5. India, with service to Burmese and Indonesian ports.

According to calculations of the State Planning Commission the following foreign-trade goods are to be transported by ocean shipping in coming years:

Year	Export	Import
1959	2,300,000 tons	4,800,000 tons
1960	2,600,000 tons	5,400,000 tons
1961	2,900,000 tons	6,600,000 tons
1962	3,100,000 tons	7,100,000 tons
1963	3,300,000 tons	7,500,000 tons
1964	3,350,000 tons	7,800,000 tons
1965	3,400,000 tons	8,500,000 tons

(To be continued)

D. INLAND SHIPPING

No. XI/104/1959, 11 November 1959 Unsigned article
Page 1-5

In the Seven-Year Plan law, the following functions have been assigned to inland shipping:

1. to increase goods transportation performances of inland shipping by 153% over 1958;

2. to increase the trips of the people's-owned fleet from 28 in 1958 to 52 in 1965 per ship by introduction of through-service, decrease in stop-over time and increase in travel speeds;

3. to increase the capacity of the people's-owned inland fleet by some 73,000 tons freight space, primarily through use of motor freighters, and by rapid introduction of conveyances and containers after testing.

In order to evaluate the functions of inland shipping during the Seven-Year Plan, its development since 1945 must be taken into account more so than in the case of other transportation carriers. Inland shipping involves a means of transportation which after conclusion of the war was not reconstructed completely new as perhaps ocean shipping or air transportation, and was not administered centrally by the Government prior to conclusion of the war, as was the "German National Railway". Although the greatest part of inland shipping situated in the area of today's DDR had been sunk by war's end, raising and repairing of the ships was begun within a short period of time. In the fall of 1945 the principal waterways were essentially navigable again.

Floating units of expropriated "capitalist inland shipping firms" or of firms based in West Germany and located at the end of 1945 within the Soviet occupation zone, as well as the ships of industrial fleets (all modern self-propelled vessels and tugs still available in May 1945 were transported as reparations to the Soviet Union or turned over to the Poles by the Soviets) were placed under the jurisdiction of the "State-Owned Oder-Shipping Co." (SOAG--- Staatliche Oderschiffahrt A. G.). At the beginning, use of these ships was directed exclusively by Soviet and Polish authorities. Not until mid-1946 were German representatives included. Vessels belonging to private individual shippers and other shipping units not subordinated to the SOAG such as municipal, factory -owned ships of limited capacity, port vessels etc. were placed under the jurisdiction of the "Industrial Association for Inland Shipping" (AGB .... Arbeitsgemeinschaft Binnenschiffahrt) which regulated their use.

On 1 October 1949 a reorganization of the administration of inland shipping occurred. The "German Shipping - and Cargo-Handling Administration" (DSU ... Deutsche Schiffahrts- und Umschlags-betriebszentrale) was formed as a people's -owned transport-, cargo-handling-, and storage- operation. Its function within the framework of the confirmed transportation plans was to carry out all transportation tasks for passenger and freight traffic on the water-ways of the DDR. Simultaneously it was responsible for cargo-handling and storage of goods during transition from inland shipping to another transportation carrier. The DSU closed a transportation contract with private ship owners, and beyond this had the power to guide and direct all available transportation capacities. A renewed reorganization occurred at the turn of the year 1956/57 after the DSU - Administration had already been dissolved previously and in its place 3 DSU-operations, Berlin, Magdeburg, and Stralsund had been created. Effective 1 January 1957 the 3DSU-operations were dissolved. The entire people's-owned fleet was placed under the jurisdiction of the newly created German Inland Shipping Co. The heretofore legally dependent inland ports were combined into 7 legally independent people's-owned operations in the form of port associations. In this manner inland shipping essentially derived its present structure. The inclusion of the private ship owners in carrying out the tasks of inland shipping occurs through the conclusion of performance -- or charter agreements between the VEB German Inland Shipping Co. and the private ship owner.

During the period of the first Five-Year Plan, hardly any new units were placed at the disposal of inland shipping. Any inland ships constructed within the DDR, e.g. tugs and motor freighters, were exported or went as reparations to the USSR. Only overhauls, reconstructions and repairs were undertaken, provided that facilities were even available at inland shipyards for this purpose. In 1951 ships from the people's -owned inland fleet were responsible for 37.4% of the total transportation volume and 45.7% of the total transportation performance. Private shipowners with their fleet were responsible for 60.2% of the total transportation volume and 49.2% of the total transportation performance. Within the frame-work of domestic German trade and foreign trade, especially with Czechoslovakia and Poland, 2.4% of the transportation volume and 5.1% of the transportation performance were achieved by the use of foreign fleets. Up to 1955 the ratio was shifted as follows: people's-owned fleet = 48.5% of the total transportation volume and 47.7% of the total transportation performance; private fleet = 44.1% and 37.3% respectively; foreign fleets = 7.4% and 15% respectively.

At the end of the first Five-Year Plan the inland fleet was "obsolete and mismanaged" ("Schiffahrt" [Shipping] October 1959). Only after 1955 did responsible organizations begin to make new

investments in inland shipping. From 1955 to 1958, 12 standard barges, 10 tugs, 7 icebreakers and 34 pusher tugs were put into service. During the transition period until merger with the greater new construction program is achieved, several measures were undertaken at the end of 1957 to achieve a high utilization of available capacities to increase transportation performance despite decreases in fleet capacity:

1. development of the socalled "Z-drive", installation of which converts barges into self-propelled vessels;
2. raising of speed limits on canal routes;
3. installation of 18 shuttling services;
4. introduction of schedules on individual canal routes and their experimental trials on the Elbe and Saale rivers;
5. concentration on the utilization of units equipped with "Z-drive" as a standard feature;
6. strengthening of the towing power in Magdeburg-Buckau, Domitz, Riesa, Torgau;
7. installation of an iron-shuttling service Brandenburg - Kirchmoser;
8. improvement of towing service through Magdeburg and through-towing from Stralsund to Hohensaaten;
9. testing of night service.

The utilization of the people's-owned fleet was increased through the realization of these measures from 22.4 in 1954 to 28 in 1958 and to 29.3 (expected plan quota) in 1959. Approximately 60% of the total available load capacities, whose total is unknown, are people's-owned and some 40% are still privately-owned.

During the Seven-Year Plan the first larger new investments are to be made which also permit large-scale withdrawal from traffic of obsolete vessels. By 1965 a total of 119,000 tons stowing capacity primarily self-propelled vessels, are to be put into service. When the Seven-Year Plan law discusses the expansion of capacity of the people's-owned inland fleet by 73,000 tons it means that 46,000 tons stowing capacity are to be removed from service because of obsolescence during the same period. To increase towing capacities, 4,000 hp towing power are to be put into service by 1965. In addition, available tugs are to be generally overhauled, with simultaneous replacement of existing coal-fired steamers by diesel engines or oil-burners. In addition, on all main waterways through-shipping in the form of 20-hour operation is to be introduced.

The greatest difficulties presented to inland shipping by the Seven-Year Plan are in recruiting the necessary crews. On the one hand, additional mechanics and captains are required as a result of the increasing motorization of the towing fleet with the help of "Z-drives", and on the other hand the introduction of 20-hr. operation necessitates staffing of the ships with 2 complete crews, each of which works a 10-hr. shift. The Ministry for Transportation

believes that it is possible to release on a large scale inland shipping workers from currently existing units by extensive mechanization. It remains to be seen, however, just how far it will be possible to make available a total of 1500 trained inland shipping workers, necessary for the realization of the program, in addition to the current work-force situation. It should not be forgotten in this connection that in coming years a special task will arise for people's-owned shipping from the need to provide crews for private ships since by 1965 over 80% of their owners and captains will retire from their profession on the basis of their age.

(To be continued)

E. WATERWAYS AND PORTS

No. XI/105/1959, 12 November 1959 Unsigned article
Pages 1-8

The Elbe River is still the most important waterway for inland shipping in the DDR. After war's end construction measures were undertaken on the Elbe in order to increase navigability and to continue regulation operations, already begun in the thirties for improvement of channel depths. Individually the following may be mentioned:

1. removal of drift danger against the jetty from rising water levels at the railroad bridge Riesa by blocking the old Elbe branch situated behind the jetty.

2. improvement of the port entrance of Tangermunde where traffic was often obstructed due to constant sand-deposit build-up.

3. regulation of the stream on the route near Bitter, where during low water levels only limited channel depths prevailed and wandering sand banks made shipping difficult, as well as deepening the channel water by 50-60 cm.

Several additional important projects are currently in progress which are to be concluded in the coming years. Among these is the construction of dual-stream routes for a total length of about 30 km below the Havel River mouth to improve the waterway from Berlin to Hamburg. The dike groups near Sandfurth-Ringfurth above Tangemunde, destroyed several years ago by floods and ice, are also currently being restored. The lack of dikes has led to considerable sand deposits in the stream and thus caused a decrease in channel depth. Measures planned for low-water regulation of the Elbe are to be concluded by 1975.

In the Saale River region the Nienburger cutoff was completed in 1957. As a result the Saale waterway was shortened by 1.3 km. In 1960 the Plotzkauer cutoff below Ahlsleben will be completed.

As a result of combat action the Oderhavel Canal was destroyed to such an extent that necessary traffic safety was non-existant. Not until 1949 was repair of this important canal begun. In 1950 and 1951 the sluice gates near Lichterfelde and Pechteich, which are to protect the summit pool of the canal against possible damages from no - load conditions, were newly constructed. In order to remove the damage to the canal bed, it was laid dry in 1953.

On the 100-km long boundary route of the Oder from Ratzdorf to Friedrichsthal the bank protections below Hohensaaten constituted the focal point of water construction since 1950. Since 1950 about 800-m of bank protection is erected annually. In 1964 the protection work is to be completed. Together with Polish authorities,

regulation of route portions between Lebus and Kustrin, continually difficult to navigate because of sand deposits, was begun in 1956. These projects are to be carried out more intensively in the coming years.

In 1953 near the Oder-Spree Canal near Furstenberg the inland port for the blast-furnace cement plant of Stalinstadt was built. This port has access to a spacious turning basin. Special water construction measures were necessary since the water level of the port is higher than the terrain and lies approximately 4 m above ground-water level. Since the end of the war, the largest inland waterway construction project was the construction of the Havel Canal, completed in 1952. It branches off near Niderneuendorf and again flows into the Havel near Paretz. This canal, whose construction resulted primarily from political consideration, since through it inland shipping of the DDR was to become independent of travel on West Berlin waters, has a length of 23 km. Near Schonwalde a sluice was constructed through which the water-level gradient of about 2 m is overcome.

Among the most important constructions in the Berlin water region are:

1. new construction of the weir at the lower sluice of the Landwehr Canal for better regulation of the water levels in the pool;

2. new construction of the dam in the Spree River near Charlottenburg;

3. Construction of the 150-m long cutoff through the industrial railroad embankment near Rudersdorf, as a result of which the single-ship traffic of 1,000-ton ships between Rudersdorf and Stalinstadt will become possible.

In addition to these important water construction measures for the improvement of inland waterway conditions, extensive mechanization projects of sluices have been undertaken since the end of the war, in order to speed up circulation of transportation means. Among others, the sluices at Charlottenburg, Furstenwalde, Rathenow, Garz and Grutz were mechanized. Extensive investments were also planned to facilitate entrance of ships into the sluices.

The primary effort expended in past years on inland water ports was in the removal of war damages and aftermath damages such as dismantling etc. with simultaneous modernization and mechanization of the installations. New port capacities were put into service especially at Domitz, Wittenberge, Tangermunde, Magdeburg, Wittenberg, Frankfurt, Furstenberg and Stalinstadt.

In addition to the inland waterways, ocean routes were also expanded after 1945. The channel to Wismar was deepened by 9.50 m. This enabled ocean vessels up to a size of about 12,000 tons to enter this port. The Peene River passage and the entrance into the Peene, too, were graded and deepened, as a result of which the connection

from the Kleinen (small) Haff to the Greifswalder Bodden and the entrance to the ports of Anklam and Wolgast were improved. The largest objective was the construction of the ocean canal near Warnemunde in 1957 and 1958, which is to lead to the new Rostock ocean port near Petersdorf. In addition, almost all wrecks on ocean routes under DDR jurisdiction were eliminated.

The seaports Rostock, Wismar and Stralsund situated on the Baltic Sea coast possessed only a limited significance prior to 1945 because of their geographic location and lack of a direct inland waterway connection. Only after the end of the war was greater attention paid to them as the sole seaports of the Soviet Occupation Zone (SBZ) or the DDR. Port associations were formed in 1947 in Rostock, Wismar and Stralsund, which were responsible for extension and administration. In 1954 the port associations were reorganized into VEB seaport operations. In 1958 the merger of the 3 seaport operations into uniform VEB United Seaports took place.

Extension of the Rostock port after 1945 was essentially determined by transports from and to the Soviet Union. After restoration of the war-damaged installations, reconstruction of the coal and ore shipping piers was begun in 1956. Simultaneously a deepening of the channel by 7.30 m took place. Work was completed in 1958. Currently at least 4 ships of medium tonnage may load and unload simultaneously at this pier. Currently four 10-ton bridge cranes and 3 full gantry cranes are being installed in the port of Rostock. In addition extensive small-scale mechanization projects are planned. In coming years track installations will also be extended in order to improve freight-car assembly and train formations.

Until 1945 essentially only ships up to 2000-ton load capacity entered the seaport of Wismar. Transshipment was primarily limited to import or export of coal, wood, grain or sugar. Extension of the Wismar port to a functional ocean port was begun in 1947. By 1950, Wismar emerged as a potash port with a fully automatic potash dumping installation considered the most modern in Europe. In ensuing years a pier for processing ships up to 12,000 tons and a dock for equally large ships for grain transshipment were created. Simultaneously an oil harbor including storage tanks was created. Currently a by-pass track for oil and potash transshipment is being installed, so that here, too, freight-car assembly and train-processing can be improved.

In the seaport of Stralsund funds were limited almost exclusively to the restoration of damaged installations or their replacement by new ones.

The other Baltic Sea ports such as Wolgast, Greifswald and Ueckermunde have not received any essential funds since 1945. Precautions were merely taken to prevent decay of existing installations.

The development of DDR Baltic Sea ports and inland waterways was essentially determined by national viewpoints until 1957/58. Since 1957, i.e., since the Council for Mutual Economic Aid also concerns itself to a greater degree through its organizations with transportation problems and attempts to reach agreement in plans, international considerations are coming to the fore to a greater degree in the construction of waterways and ports. This has become especially clear in 1959 after formation of the standing Working Committee for Shipping within the standing Commission for Economic and Technical-Scientific Cooperation in Transportation of the Council.

The most important port and waterway objective of the Seven-Year Plan is the Rostock ocean port. The construction of a harbor became the more pressing with the expansion of the merchang marine and ocean export and import after negotiations with Poland for joint use of the port of Stettin failed and the DDR declined to continue use of the port of Hamburg as the principal transshipment point. In 1955 and 1956 it was generally accepted that the port of Wismar, which at that time could already be entered by ships of 10,000 tons, would take precedence over Rostock. The SED regional administration Rostock, headed by 1st Secretary Karl Mewis, intervened on behalf of an ocean port near Rostock. The SED regional administration succeeded in convincing the Central Committee (ZK) of the necessity for installation of a port near Rostock. The decision was already rendered in 1957. In accordance with preliminary plans the Rostock ocean port was to achieve a total transshipment capacity up to 24 million tons. In order to render possible smooth delivery and pick-up of goods to the port it was planned not only to considerably expand existing railroad and highway connections but also to build a "North-South Canal" which was to connect Rostock with the Elbe River. It was especially intended, with realization of this project, that Rostock assume the position and importance of Hamburg as principal transshipment point for oversea traffic of Czechoslovakia. In 1957/58 Czechoslovakia was indeed won over for this North-South Canal project, whose merchant marine could obtain a favorable home port due to this canal, and which could yield for Czechoslovakia real foreign exchange savings. The first plans were completed in 1958. Initiation of the first construction projects was originally planned for the beginning of 1959. If to date ground has not been broken for construction of the North-South Canal and canal construction has not received acceptance in the Seven-Year Plan, even though the 5th Party Congress of the SED (10-16 July 1958) has authorized the project, it is because the Council for Mutual Economic Aid and its organizations issued contrary decisions and recommendations during the first quarter of 1959.

In 1959 it was the Soviet Union which spoke out against the realization of the North-South Canal in the standing Commission for Transportation and the standing Working Committee on Shipping, and which gave preference to another objective, i.e., the construction of the Oder-Danau Canal. The Soviets clearly backed Polish desires. Poland in past years had repeatedly demanded that concrete steps finally be undertaken for realization of the Oder-Donau project, which had already been planned by the Austro-Hungarian Empire, at conferences of states bordering on the Donau or of their transportation and inland waterways experts with those of the DDR and Czechoslovakia. It was repeatedly primarily the Czechs, and later also responsible functionaries of the DDR, who opposed the already partly accepted official plans. Initially the Czechs had the least economic interest in construction of the canal. Their principal transshipment capacities are situated on the Elbe and Moldau rivers and therefore the port of Hamburg appeared as the natural seaport of Czechoslovakia. Even as Czechoslovakia displayed greater interest in Donau traffic, increased its processing and transportation capacities on the Donau, and made Constanza into a home port for the greater part of its fleet, interest in the Oder-Danau Canal remained limited, especially after the DDR presented the North-South Canal project. The DDR on its part automatically lost interest in realization of the Oder-Donau project beginning at the time when the Project Ocean-Port Rostock was placed on the agenda. Thus until the beginning of 1959, negotiations among the 3 countries for creation of the Oder-Donau Canal remained without practical results. Not until the Soviet Union clearly again favored the Oder-Donau Canal, and after a first agreement was reached on financing, construction of the Oder-Danau Canal was again placed on the agenda and measures for realizing this project were introduced. As early as June 1959 a Czech planning office termed "Hydroproject," empowered with the planning and preparation of a general study, completed its work in Brunn and issued the documents to the participating countries. The Soviets for their support of the Oder-Donau project were able to effect some economic motives. One of these motives was the creation of a hook-up of a system of waterways planned by the Soviets and already under construction, to connect the east- and central-European waterways system. The waterways hook-up planned by the Soviets and under construction since the beginning of 1958 provides for a connection between the Elbe and Dneiper rivers. The waterway encompasses the Dneiper, Tripjet, Muchawiec, Bug, Weichsel, Bydgoszcz-Canal, Notec, Warthe, crosses the Oder River and by way of the Oder-Elbe canal connections leads to the Elbe. The Soviets argued that a North-South connection, would significantly complement the connection of the Oder with the Donau which essentially is a waterway running from East to West,

and create a continuous inland waterway traffic from the Baltic Sea practically to the Black Sea. The argument concerning unusually high costs in realizing the Oder-Donau project, which the DDR and Czechoslovakia continually used to shelve this realization, was removed from the discussion as a result of the fact that the Soviet Union on its part declared itself ready to provide necessary funds.

The Oder-Donau project for the time being is realized by regulating continuously the Oder up to Ratibor, by grading it and by rendering it navigable in coming years. Czechoslovakia will undertake first steps to grade river courses, to be made useable for the canal route, e.g., the Morava River. Construction of the canal itself is not to begin until after 1963/64. The Soviet Union must waive construction of the North-South Canal for the coming years as a result of the decision of the Council for Mutual Economic Aid to support the Oder-Donau project. It remains to be seen whether this project will ever be taken up again. Much evidence points to the fact that the North-South Canal project has been abandoned forever after experts have pointed out that all planning data developed to date, which were based on damming the Warnow River with the aid of a sea lock, are not realistic from a geological standpoint.

(To be continued)

F. WATERWAYS AND PORTS (CONTINUATION)

No. XI/106/1959, 13 November 1959 Unsigned article
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The responsible organizations of the Planning Commission reacted extraordinarily rapidly in January 1959 upon the decision of the Council for Mutual Economic Aid and its organizations concerning construction of the Oder-Donau Canal and postponement of the North-South Canal project. The projection, planning and construction offices established for projecting the ocean port Rostock-Petersdorf, immediately after announcement of the decision of the Council for Mutual Economic Aid, were ordered to conform to the new situation with suitable new plans and reprojections of the port project, i.e., to undertake final planning of the ocean port in such a way that it can function essentially without an inland-waterway connection.

As early as beginning August 1959 the first suggestions for correction of the original total port concept were submitted. The then existing plans called for transfer of mass and heavy goods, transshipped in the ocean port, directly from ship to ship, with delivery and pickup to take place through the North-South Canal and the Elbe waterway. Contrary to this, the revised basic concept calls for the construction of an industrial port for transshipment especially of mass and heavy goods south of the large wet docks of the commercial harbor between the towns of Langenort and Oldendorf. This specialty port for transshipment of bulk material and mass piece goods such as wook, rolling mill products, oil-producing fruit etc. will have at its disposal two docks of 400-m length each. The piers will be equipped in such a manner that smooth transshipment of these goods will be possible and that storage for long periods is guaranteed. The wet docks to be built near Petersdorf will become the actual commercial harbor of the ocean port Rostock through the construction of the industrial port, and will serve exclusively for the transshipment of piece goods. Since the capacities were not fully utilized a plan was added to the new basic concept to extend the west pier of future wet dock A as a special passenger pier. The new basic concept also provides for some changes in the original oil-harbor project, which, however, are relatively limited and which have no influence on the planned transshipment capacities in the additional extension.

The basic concept of the Rostock-Petersdorf ocean port, taking into consideration the now intended plan changes, shapes up as follows:

Wet dock B, currently under construction, and whose first facilities are to be put into service on 1 May 1960, as well as

the east pier of wet dock A, to be constructed after completion of wet dock B, will be constructed as the actual commercial harbor. Primarily piece-goods will be transshipped here. The west pier of wet dock A will be constructed as a passenger pier. As a result, the new Rostock ocean port will become the home poart of the "FDGB"-Fleet for Vacationing Workers." South of the commercial harbor an industrial port will be constructed with two wet docks and extensive storage depots and storage yards. Transshipment of mass, bulk and heavy goods takes place here, which must undergo storage for long periods until shipment for further processing to industrial branches or from receipt at the port to shipment elsewhere. The oil harbor will be built in its originally planned form, except for a few minor projection changes.

The new total concept of the future Rostock-Petersdorf ocean port has also necessitated a new projecting of supporting installations. The work on this has not yet been concluded so that to date no survey exists as yet about detailed projection changes to be expected. However, it may be said that especially in the area of port transportation, especially the port railroad, essential changes can be expected.

Construction of the industrial harbor necessitates extensive track shifting and the creation of loading and train assembly possibilities etc., which originally were not planned to this extent. It will also be necessary to provide a passenger traffic connection to the west pier of wet dock A.

It was originally planned that the total capacity of the Rostock ocean port was to be extended to 16 million tons transshipment capacity annually by 1965. Now only 7 million tons transshipment capacity annually by 1965 are mentioned.

During the Seven-Year Plan after assumption of operations by the Rostock ocean port, the other ports on the Baltic Sea are to be specialized extensively. The port of Wismar is to transship primarily potash, grain, wood and to a lesser degree even piece goods. The oil harbor of Wismar will not be further expanded, since the necessary new transshipment capacities for oil will be created in Rostock. The Stralsund port will be utilized primarily for handling Baltic Sea traffic of small ships, especially 450-ton (dead-weight) coastal motorboats. The port of Wolgast will be specialized for transshipment from small Baltic Sea ships to inland ships and in addition will serve as a shunting point for coastal motorboats when entrance to other ports may not be possible for some reasons. The port of Anklam shall also serve as a shunting port in the future, which can be entered by small Baltic-Sea ships after canalization of the Peene mouth. The same is true for the port of Ueckermunde. The ports Warnemunde and Sassnitz will serve exclusively Denmark or Sweden.

In the coming years the importance of the part of Stettin will rise considerably for DDR ocean shipping. This will not only occur after realization of the Oder-Donau project, but already at a much earlier time, namely with the completion of the large funding objectives near Schwedt/Oder. Traffic planning provides for delivery of wood and cellulose from the Soviet Union, Finland and the Scandinavian countries directly by way of Stettin through the Oder to Schwedt. Transshipment from ocean ships to inland ships is to take place in Stettin until such time as the Oder has been canalized to such an extent that coastal motorboats can directly enter Schwedt.

(To be continued)

G. HIGHWAY TRANSPORTATION

No. XI/107/1959, 19 November 1959 Unsigned article
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The following functions have been assigned to highway transportation under the Seven-Year Plan law:

1. Freight transportation performances are to be increased by 156% over 1958 by 1965. Performances per ton of freight space of people's-owned public motor transport are to be increased by 146% by 1965.

2. The vehicle pool of people's-owned public motor transport is to be expanded and to be renewed by putting into service new vehicles, especially trucks with special mounts and special trailers for transporting building materials, structural members and containers as well as of refrigerated goods. The transfer of freight space from the people's owned industrial plant traffic to people's-owned public motor transport is to be continued in order to increase economy.

3. The road surface is to be renewed or strengthened and the roadway is to be widened in the case of 2,700 km of national highways and 5,700 km of distric roads. 700 km of classified roads are to be newly constructed by 1965 and all war-damaged and temporary-bridges within the national highway system are to be replaced by 1963. Construction of a super-highway from Berlin to Rostock is to begin in 1963.

4. In order to improve and maintain the communal highway network, a total of 1.7 billion DM will be made available from the national budget. In connection with the housing program at least 2,600 km of local and development streets are to be newly constructed by 1965. The cities and communites are to install 2,500 km of bicycle and motorcycle paths by 1965.

During the period from 1951 to 1958 the transportation volume of motor freight traffic has increased from 103.69 million tons to 226.53 million tons. The people's owned motor-freight traffic accounted for only 22.87 million tons in 1951. Private motor-freight traffic, on the other hand still reached a transportation volume of 80.82 million tons in 1951. In 1958 the transportation volume of the people's-owned motor-freight traffic had risen to 148.87 million tons, with private motor-freight traffic reaching only 77.65 million tons.

People'sowned motor-freight traffic received a very great boost from the systematic addition of new trucks, preferential treatment in rendering repairs, granting of orders and not least of all from transfer of private transportation operations to "national property."

People's-owned public motor traffic in 1951 had to handle a transportation volume of 2.01 million tons, 0.567 million tons of which were handled in long-distance traffic (distance greater than 50-km air line from the point of departure). In 1958 the transportation volume of the people's-owned public motor-freight traffic amounted to 43.701 million tons, of which 2.256 million tons were long-distance. The transportation performance increased from 126.6 million ton-km (tkm) to 1,011.2 million tkm in 1958. In 1951, 95.7 million tkm transportation performance was in long-distance traffic, and in 1958, 425.5 million tkm.

People's owned plant traffic transported a volume in 1951 which with 20.86 million tons was by about 10 times higher than the volume of the people's-owned public motor-freight traffic. By 1958 the relations changec considerably, although the people's-owned plant traffic in 1958 with a transportation volume of 105.177 million tons still exceeds by far the volume which public people's-owned traffic could attain. L6ng-distance traffic in plant transportation rose from 1.165 million tons to 2.555 million tons, thus exceeding long-distance traffic of public people's-owned transportation by only a small amount. Transportation performances of plant traffic in 1951 equalled 505.9 million tkm, of which 157.9 million tkm were long-distance transportation, and by 1965 are to rise to 1863.7 million tkm, of which 401.8 million tkm are long-distance traffic.

Development of people's-owned public traffic and plant traffic shows that with a transportation volume twice as great, which plant traffic attained in 1958 in comparison with public traffic, the transportation performance of the plant traffic amounted to only about 180% of the performance of people's-owned public traffic. Since statistics provide no data concerning the number of truck units and their loads, calculation of motor traffic intensity is not possible by people's-owned public motor traffic and people's-owned plant traffic. Comparison between transportation volume on the one hand, and transportation performance on the other, indicates that available capacities in people's owned public motor traffic are utilized to a greater extent. Thus the requirement contained in the Seven-Year Plan law may be interpreted, which will further the measures, begun in 1959, for the transfer of capacities from people's-owned plant traffic to people's-owned public motor traffic in coming years.

Plans contained in the Seven-Year Plan for the development of motor freight traffic indicate that until 1965, it is predominantly to fulfill the role as short-distance traffic medium, transportation supplier for the "German National Railway" and special and rapid transportation medium with special assignments. In this connection those plans deserve consideration which the Ministry for Transportation has attempted to promote for nearly a

year, to create special service performance operations under the jurisdiction of local councils which are to expedite transfer from trucks to railroads cars and vice versa, or from trucks to inland ships. With the aid of these local transfer operations, the Ministry for Transportation hopes to achieve two important aims:

To expedite transfer of motor-freight capacities from plant traffic to people's-owned public traffic, by giving people's-owned operations the guarantee of an orderly delivery and pickup by service performance contract if they waive maintenance of their own plant traffic when using people's-owned public motor traffic;

To increase transfer speed, as a result of which highway traffic as well as the "German National Railway" or inland shipping would have the opportunity to increase trucking or shipping circulation.

The effort on the part of the Ministry for Transportation to create service-performance operations at as many points with high transfer f rom one traffic carrier to another as is possible, with such operations carrying out these transfer functions, indicates that motor transportation has been assigned the task in coming years to assume short-distance and connecting-traffic from the production site to another transportation carrier, namely railroad or inland shipping. If in the perspective it had been planned to use motor transportation primarily as a direct transporting medium from producer to producer or from producer to consumer, then the creation of such service-performance operations would not be required.

Even if it must be assumed that motor-freight traffic will retain as its main assignment short-and connecting-traffic during the coming years, it is evisioned that the long-distance traffic performance share of motor-freight traffic will increase percentage-wise more rapidly than the total freight-transportation performance. Especially after putting into service the first capacities of the new Rostock-Petersdorf ocean port, long-distance traffic will gain in importance since a major part of the transferred goods per truck must be delivered and picked-up in Rostock simply because the "German National Railway" is not capable of doing so alone. At first, primarily the pick-up of imported and easily spoiled necessities and luxuries and delivery of small piece goods to Rostock will occur by means of highway transportation. After completion of the Berlin-Rostock super-highway large piece goods can also be transported since it will then be possible to use heavy and very heavy trucks. The further expansion of the fishing industry will result in increased long-distance traffic. Trucks with special mounts will be used to deliver southern regions of the DDR, e.g., with fresh fish and smoked goods. The Ministry of Transportation plans the organization of a direct line service with Rostock to improve fish supply. This is to be introduced in such a way that a

certain number of trucks with trailers shuttle between Rostock-Marienehe, seat of the largest fish combine, and Chemnitz or Leipzig or Dresden, and at the same time suppliesfish to towns along this route. To make this shuttle service worthwhile, the Ministry for Transportation plans to achieve that part of the performance capacities of the vehicles used will also be utilized on the return trip. The Ministry for Transportation, the State Planning Commission and foreign trade functionaries are currently testing the possibility to create large warehouses in Rostock for a number of products, continuously produced and exported to a great extent, and a large part of which are transported by ocean shipping. Delivery to these warehouses, e.g. cameras and photographic products from Dresden, radios, lightweight machine components, products from business machine industries, paper from Saxony and Thuringia regions is to be assumed by long-distance truck columns used for shuttle service. The Ministry for Transportation and foreign trade expect with introduction of such a shuttle system an advantage over railroad transportation alone, which is less easily operated than long-distance freight traffic.

Most of the difficulties in realizing these transportation plans will result from the poor conditions of the highways. Responsible public road-functionaries admit the fact that the roads are in a completely neglected state.

"... The current high wear-rate of motor vehicles and their high susceptibility are primarily the result of poor road conditions, especially those in community areas. Undoubtedly an extensive improvement in the extension of our highway system requires great financial and material expenditures... After a carefully-considered estimate the excess expenditure for preventive repairs of trucks caused by poor and insufficient roads amounts on the average to some 13 Pfennig/km for truck traffic, or some 300 million Marks annually, a sum which amounts to more than 50% of the total available budgeted funds for roads and bridges in 1959..." (German Highway Traffic [Der Deutsche Strassenverkehr], September 1959).

The limited funds available for further expansion of roads and bridges do not permit fulfillment of all urgently necessary intents of the Seven-Year Plan. At first the long-distance traffic roads, the so-called national highways, as well as the most important district roads will be renewed, improved and widened. All national highways and district roads to be renewed in coming years, will be widened from 5.70 m to 6.20 m. The newly constructed roads will receive a width of 7.50 m. On especially heavily travelled roads a special lane will be created for slow traffic. National highways of type 1 (very good road) will increase from 31.4% in 1958 to 47.0% in 1965, and district roads from 13.8% in 1958 to 28% in 1965. According to plan, national highways with

heavy surfaces will increase during the same period from 28.9% to 36.3% and those with medium values for district roads are 13.6% or 18% for heavy surfaces and 16.9% or 24% for medium-heavy surfaces.

Whereas the requirements for transportation carriers in the Seven-Year Plan, widening and renewal of national and district roads will at least be fulfilled in part, the situation of community-road construction will hardly permit any improvement in coming years. Material and road construction capacities as well as funds are just sufficient to carry out road and street construction in the housing program. Funds requested by communities and districts for renewal and repair work amount to "a multiple of available potential" according to the journal German Highway Traffic /Der Deutsche Strassenverkehr/, September 1959, which also notes: "Even with optimum utilization of financial means, improvement of the community road system may be concentrated only on the most important measures."

(To be continued)

H. AIR TRANSPORTATION

No. XI/108/1959, 20 November 1959 Unsigned article
Pages 1-5

Air transportation is the youngest transportation branch of the DDR. Carriers of air traffic are the airline companies VEB "Deutsche Lufthansa" and "Interflug G.m.b.H." Domestic service and air traffic with the socialist countries has been assumed by VEB "Deutsche Lufhansa," while "Interflug G.m.b.H." isused for air traffic with the capitalist countries. This division of operations became necessary after the VEB "Deutsche Lufthansa" was denied by court decisions in western countries to take-off and land on airports of western countries under the the name "Deutsche Lufthansa" and to use the trademark of the "Deutsche Lufthansa" (stylized flying crane).

The exact founding date of the VEB "Deutsche Lufthansa" is not known. In the first statute of 15 February 1956, which went into effect retroactively on 1 January 1956, it is stated that the "Deutsche Lufthansa" was founded as a people's-owned operation "in May 1954" /See Note/. The first mention of the "Deutsche Lufthansa" is made in a communique concerning a session of the Presidium of the Council of Ministers on 28 April 1955, in which the following appears:

"... In the course of the session the Presidium of the Council of Ministers dealt with civil aeronautics of the DDR. The Minister of the Interior, Willi Stoph, reported about the operations of the Deutsche Lufthansa accomplished thus far, and about the agreement made with the Government of the USSR on 27 April relative to the rights to the Schonefeld airport. ... Measures undertaken by the Deutsche Lufthansa were approved and decisions necessary for further expansion of civil aeronautics in the DDR were formulated. ..."

(Note: The VEB "Deutsche Lufthansa" was initially under the jurisdiction of the Ministry of the Interior. Since enactment of the new statute of 14 November 1957, the Lufthansa is administered by the "duly-appointed representative of the Chairman of the Council of Ministers" and is directed by the Office for Civil Aeronautics in the Ministry for Transportation).

It is certain that the founding date "May 1954" as indicated in the statute is incorrect. One month before the "Deutsche Lufthansa" is officially named for the first time, mid-March 1955, representatives of the "Deutsche Lufthansa" were not present at an international conference of representatives from civil aeronautics operations of the USSR and the People's Democracies in Warsaw; the Lufthansa, had the data of the published statues that became

effective in 1956 been correct, would have had to have been in existence for 10 months at this time. The interests of the DDR were represented by the representative of the Ministry for Transportation, State Secretary Heino Weiprecht. In the final report all represented airlines are listed, but not the "Deutsche Lufthansa." Additional evidence that founding and naming of the "Deutsche Lufthansa" occurred only immediately prior to the session of the Council of Ministers of 28 April 1955, is a statement by the First Secretary of the Central Committee of the SED, Walter Ulbricht, made during the first Building Conference in East Berlin at the beginning of April 1955 to the effect that the development of foreign trade requires the construction of a "strong transport air fleet." Ulbricht never mentioned the "Deutsche Lufthansa," which at that time would have had to have been in existence for 11 months.

After Soviet pilots from "Aeroflot" had begun training German flying personnel in April 1955, the first aircraft of type "IL 14," purchased for the Lufthansa in the Soviet Union, arrived at the Berlin-Schonefeld airport in August 1955. The first flight of an "IL 14" bearing the insignia of the "Deutsche Lufthansa" occurred on 16 September 1955. The first "Lufthansa" route was officially opened on 4 February 1956 between Berlin and Warsaw. Domestic German air traffic began on 22 February 1956 with the special flight service Berlin-Leipzig for the Leipzig Fair. Official inland route traffic was not initiated until 16 June 1957. On 13 May 1956 the routes Berlin-Prague-Budapest-Sofia and Berlin-Prague-Budapest-Bucharest were opened. In August 1956 special flights from Berlin via Warsaw to Moscow were begun for the Soviet Union. With initiation of the winter-flight schedule on 7 October 1956, the "Deutsche Lufthansa" has also begun official flight traffic on the route Berlin-Moscow with stop-over in Warsaw.

The "Deutsche Lufthansa" stops at the following cities on its international service:

Country	City	Stop-over
USSR	Vilna	Warsaw
	Moscow	Warsaw-Vilna
Poland	Warsaw /See Note/	--
Czechoslovakia	Prague /See Note/	--
Hungary	Budapest /See Note/	Prague
Bulgaria	Sofia	Prague-Budapest
Rumania	Bucharest	Prague-Budapest

(Note: Service to Warsaw, Prague and Budapest consists of stop-overs enroute to Moscow or Bucharest or Sofia.)

During the summer months the following routes are currently flown in inland traffic:

Berlin-Barth-Berlin	Berlin-Erfurt-Berlin
Dresden-Barth-Dresden	Berlin-Leipzig-Berlin
Leipzig-Barth-Leipzig	Berlin-Chemnitz-Berlin
Berlin-Dresden-Berlin	Erfurt-Chemnitz-Dresden and return

During winter, on the other hand, only the following inland routes are flown:

Berlin-Barth-Berlin	Berlin-Dresden-Berlin
Berlin-Erfurt /See Note/-Berlin	Leipzig-Berlin-Leipzig

(Note: During conversion of the Erfurt-Bindersleben airport to a second jet-airport, the "Lufthansa" uses a Soviet military airport near Gotha.)

The "Deutsche Lufthansa" has concluded fixed agreements with airlines of the USSR, Poland, Czechoslovakia, Hungary, Bulgaria and Rumania. Commercial agreements have been concluded in addition with a total of 25 airlines, including western ones. In Moscow, Prague and Sofia the "Deutsche Lufthansa" is represented by representatives. In Bucharest a representative will also be established shortly.

The central airport of the "Deutsche Lufthansa" in Berlin-Schoenefeld is currently used by the airlines of Poland ("LOT"), Hungary ("MALEV"), Czechoslovakia ("CSA"), Bulgaria ("TABSO") and Rumania ("TAROM"). This makes possible flight traffic from East-Berlin to Paris, Brussels, London, Amsterdam, Copehhagen, Stockholm, Helsinki and Vienna. The Soviet "Aeroflot" has currently cancelled its route Berlin-Warsaw-Vilna-Moscow and return. This route, however, is to be resumed in 1960. Thus far no wester airline flies a regular route to DDR airports. Only special flights by western airlines are undertaken as occasioned by special events in the DDR, as e.g., the Leipzig Fair.

The airline "Interflug G.m.b.H." existing in addition to the "Deutsche Lufthansa" was founded according to official data "in September 1958 with participation of the transportation and express services, the German Travel Bureau and the aviation industry of the DDR." It is actually a parallel operation of the "Deutsche Lufthansa." Its director is the deputy director-general of the "Deutsche Lufthansa" Karl Heiland. Its primary function "at this time" consists of assuming international consumer air traffic for passengers and freight within the framework of foreign trade and tourist air traffic. "Interflug," like "Deutsche Lufthansa," is

equipped with aircraft of type "IL 14" and shares the central airport at Berlin-Schonefeld. On the occasion of the Leipzig Spring Fair 1959, "Interflug G.m.b.H." assumed its official flight operations. It flew the Leipzig-Copenhagen-Leipzig route as part of the special Fair flight traffic. "Interflug" aircraft took on "courier service" of the DDR Ministry for External Affairs Berlin-Geneva, during the Geneva Conference of Foreign Ministers in 1959.

In 1958, the "Deutsche Lufthansa" transported a total of about 1,500 passengers on scheduled flights as well as on charter and tourist flights. An additional 250,000 passengers in 1958 participated in inland round-trip flights on the "Deutsche Lufthansa."

Both airlines currently use exclusively 2-motor intermediate-range aircraft of type "IL 14," produced largely by People's-Owned Dresden Aircraft Plants. Aircraft of various types imported from Czechoslovakia and the USSR are used for sight-seeing flights, air-taxi service as well as for agricultural flights as e.g., for pest control.

During the Seven-Year Plan the "Deutsche Lufthansa" is to be equipped especially for scheduled foreign service with turbojet and turboprop aircraft. Use of a turbojet-aircraft of type "152" developed and built by the Dresden Aircraft Plants and later a turbojet aircraft of a newly developed type "155" is provided for. Development of their own turboprop aircraft type "153" has been discontinued. The Berlin-Schonefeld and Erfurt airports are currently being equipped with installations and taxiways required for jet operation.

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East Germany

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SELECTED TRANSLATIONS ON SOVIET BLOC AIRCRAFT INDUSTRY

[Following is a translation of selected articles from the German-language periodical Deutsche Flugtechnik (German Aeronautics), Berlin, Vol. IV, No. 8, August 1960.]

I. THE USE OF ATOMIC ENERGY IN AIRCRAFT PROPULSION

- East Germany -

Pages 231-235

Dr. Reinhart Grochalski
Dresden

A. Introduction

In treating the problems of using atomic energy in aircraft propulsion, aeronautical treatises often would lead one to think that one need only choose a reactor from a well-defined series of reactors, and then mount it in a suitable aircraft. Such treatment makes a practical evaluation and technical development of the use of atomic energy all the more difficult. As a rule, an aircraft builder is not a nuclear physicist and the consideration of nuclear physics, often misconceived, diverts him from, rather than aids him in, the solution of the problem. Therefore, this article will attempt to outline the present evaluation of atomic energy in aircraft building without extensive consideration of the theory of nuclear physics.

B. Results of Work on the Use of Fission Reactors in Aircraft

The aircraft builder interested in using atomic energy need know really very little of the physical processes going on in the reactor. One can install a piston engine or a turbine in an airplane without needing an intricate knowledge of its internal workings or being able to compute them. However, it is important to consider the installation details and the standards which have been established for installation or operation.

This is equally true of an atomic reactor. Essentially, it is a furnace through which a relatively cold agent is passed to heat it to a temperature higher than its initial state. The increase of the enthalpy of the agent can then be put to work for propulsion in a suitable thermal machine, in this case, an aircraft turbine.

Since we wish to presume first of all the use of conventional airplanes, certain questions must be posed with regard to weight, dimensions, possible agent entrance and exit temperatures, and control of the furnace. Peculiarities of reactor operation, such as radiation shielding, must be considered in construction results

and the design bureau must compare fuel consumption and costs in order to reveal the possible advantages which can be derived.

Proceeding in this manner, the weight of the reactor must be considered next. A glance at the normal power plant reactors which are about as large as a small one-family house shows how hopeless it would be to install such a design in an airplane. However, closer examination reveals a division in the reactor itself, an active zone of relatively small dimensions and a radiation shield of reinforced concrete several meters thick. The dimensions of the active zone are determined by calculations based on nuclear physics. If the reactor is to function, that is, if the reaction is to progress in it, then both certain geometric dimensions and a certain quantity of fuel are required. These are closely dependant on the degree of enrichment of U_{235} in the total uranium. To construct an active zone in a functional spherical reactor a diameter of 0.3 to 1.0 meters and several kilograms of U_{235} (up to 10 kg) are needed. The active zone, which can be encased in a steel container, plays no great role in aircraft balance. Neither do the dimensions present any problem. But much attention must be given to the weight of the shielding. The thick reinforced concrete walls of the power plant reactor can be reduced by using lead shielding which has better absorption. Nonetheless, for the reactor output concerned, lead plates at least 30 to 50 cm thick are needed; in a complete shielding of the (smallest) reactor this amounts to many tons. The shielding of the smallest possible active zone determines the minimum weight of the aircraft to be designed as well as its minimum output. The minimum weight is about 20 tons; the minimum output, about 120 MW. The weight required for a possible increase in power is less and amounts to about 10 tons per 100 MW. As a result, the use of atomic energy by means of a fission reactor is practical only for very large aircraft. (Since the best protection against radiation is great distance from the source of radiation, earnest thought has been given to testing the practicality of airships using reactor power.)

The knowledge of another quantity, that of the weight of the propulsion unit, is important in the design of aircraft. This weight is computed at 300 to 400 kg/cu. m. for jet propulsion and at about 800 kg/cu. m. for chemical fuels. Reactors, including shielding, have a weight of 1500 to 3000 kg/cu. m. This high concentration of weight coupled with the necessity of removing men and equipment as far as possible from the reactor results in an unusual aircraft configuration in which the propulsion unit and the wings are placed at the tail.

The decisive incluence of shielding weight has led naturally to extensive tests in order to reduce the difference between the weight of the shielding and the saving in fuel weight. Since news about "new shielding materials" is frequently encountered in technical literature, this question should be touched upon briefly here.

In the fission process the occurance of electromagnetic γ radiation is differentiated from the corpuscular neutron radiation which occurs concurrently. The ability to absorb γ radiation is quite clearly based on the physical atomic mass of the absorber. As a result, high-density materials are better than low-density. There is no sense in wanting to test "plastics" based on polymerized hydrocarbons as being better than lead. In other circumstances such plastics act as a shield against neutrons which can pass through heavy as well as light materials because of the lack of an electrical charge. Unfortunately, these neutrons lose kinetic energy in collisions with the nuclei of the absorber, and, according to the laws of mechanics, light atoms can absorb more energy per impact than can heavy atoms. The purpose of a neutron shield is to reflect the escaping neutrons back into the reactor as nearly as possible and to make them useful in the fission process. Materials with low-density and small atomic mass are especially suited to this.

All technical efforts to reduce the weight of the shielding have been in the development of suitable combinations of γ and neutron shielding, since the arrangement of two layers of light and heavy materials one behind the other does not present the best solution.

Another possibility in reducing shielding weight is an incomplete or divided shielding. This shields the personnel and equipment but permits some radiation to escape in other directions. This arrangement results in a weight saving of about 20% over complete shielding.

It is a characteristic of the reactor "furnace" that thermal output can be generated at an arbitrary temperature level. A few research reactors in which the effective power is not great because of heat waste, operate at an absolute temperature of only 30 to 40° C with only very small differences in the primary circulation between the entrance and exit temperatures of the agent. We know that the temperatures reached in the atom bomb are presumed to be in the millions of degrees.

Therefore, the temperatures reached in the aircraft reactors do not have to depend on the reaction taking place in the reactor but can be determined arbitrarily in view of fuel problems. According to technical literature today 700° C can be controlled in a reactor, and in the near future 1000° C is anticipated. The power needed for aircraft propulsion, as foreseen at this time, will be transmitted to the turbine via a heat exchanger in a closed circulation in which a gaseous agent, such as CO_2 and helium under pressure ($\sim$ 30 atm.) will be used.

The expenditure of fuel demands special attention. It is possible to compute the energy equivalent from the assumption that one grame of U_{235}, when consumed completely, has an energy equal to 1.7 tons of gasoline. It is also possible to compute that an

airplane of 50,000 hp capacity will require 40 to 50 grams of U_{235} during a 24-hour non-stop flight. But these estimates are incomplete. In considering economy it must be borne in mind that, because of the critical mass, even for the smallest requirement several kilograms of U_{235} must always be transported and this fuel requires a considerable capital investment of 100,000 DM per kilogram. Just from the standpoint of pure fuel consumption, the example cited above (the technical feasibility of a 24-hour flight using chemical fuels is presumed), using as a basis present fuel costs and consumption, would result in a reduction of the cost of atomic propulsion to one-third to one-fourth of the present cost of chemical fuels.

C. Assessment of the Actual Possibilities for Using Atomic Energy in Aircraft

Beyond the problems in the use of a reactor in aircraft construction which have been mentioned and which can be enumerated today, there are several questions which can only be estimated because of the lack of experience in them. These deal with problems in reactor control technique, which is simply physically but which represents in technical aircraft construction, an extensive problem because of the considerable equipment requirements. And there are also the problems related to a possible crash, to radiation effects on the fuel /werkstoff/, and to ground maintenance and servicing.

Viewing the sum of all the problems, both the advantages and disadvantages of reactor propulsion, the following must be established:

The important advantage which can result from the saving in fuel weight is balanced by the radiation shielding which must be installed. The lower costs of nuclear fuel, one-third to one-fourth that of gasoline, is offset by the considerable capital outlay in forming the critical mass. Compared to present operations, maintenance and service will present additional difficulties and complications. The single advantage of very great range cannot be essential to air transport if this range is measured in multiples of flights around the world. Having established these things, one might conclude that the development of a nuclear-powered aircraft would not be practical.

But this estimate is quite different if one does not assume the employment of aircraft with high subsonic speeds, as previously assumed, but rather aircraft in supersonic and hypersonic ranges.

To assess the advantages assumed for supersonic speeds, it is practical to start with the well-proven design conditions for high subsonic speeds. Figure 1 is a diagram whereon $M = 0.8$, based on the premises of G. Backhaus. On it are computed the ranges for

various take-off weights at a given constant wing loading, once at a constant useful load (10 tons in the example), and again at a constant useful load percentage ($G_N/G_A = 0.2$). It is clearly seen that an increase in take-off weight at a constant useful load percentage and at a constant wing loading leads to a decrease in the range which can be attained. But the curves with a constant useful load at a constant wing loading cross a vertical tangent; thus, here too an increase in take-off weight is related to an increase in range only to a limited degree. In every case an extension of range is limited for chemical fuels, not to mention the fact that large aircraft with very small useful load percentages are of no interest.

The weight of nuclear fuels has little relation to aircraft size and no relation to take-off weight. An airplane using reactor propulsion, therefore, also covers the whole range to the right of each curve. The characteristic line of a nuclear powered aircraft will be represented on the diagram by a horizontal line. For an arbitrarily chosen aircraft size the range, for all practical purposes, is unlimited. Only the shielding needed for the reactor determines the minimum take-off weight or aircraft size.

Figure 1 also contains points showing aircraft in service in order to permit an assessment of the present state of development. In addition, a curve was computed for a constant percentage of useful load of 20% since it seemed worthwhile to relate the useful load carried (G_N) to the technical input (G_A). To get the curves shown it was necessary to raise wing loading by an increased flight weight. However, this is in keeping with the recognized developmental trend which holds that larger aircraft for great ranges will be designed for higher wing-loadings and, therefore, longer landing and take-off runs.

As one progresses from $M = 0.8$ to higher speeds, then according to Figure 2, it is only necessary to consider the lift-drag ratio and the power plant efficiency at a constant empty plus fixed weight [rustgewicht]. Figure 2 presents on the basis of the useful η and ε values the maximum ranges which can be attained at higher Mach numbers. The ranges are on the average one-fourth less, and this fact cannot be basically altered by the increase in ram-jet efficiency at $M > 3$. This shows the clear superiority of nuclear powered aircraft, especially at high supersonic speeds and for great ranges.

If appropriate useful loads are to be transported economically over great distances (for instance, across the Atlantic), then supersonic flight requires not only the transition to another type of propulsion (ram-jet), but also another way to generate energy. Since it is the aim of air transport to make it possible to reach the major cities of the world in only a few hours, the use of nuclear propulsion with its very small specific fuel consumption cannot be surpassed.

D. New Trends of Development in the Use of Atomic Energy

Very high flight speeds require a transition from mechanical to apparatus /Apparativ/ propulsion systems (ram-jet). The difference between take-off and landing speeds and flight speeds at high altitudes will be so great that each operation will have to have a special propulsion system. As is known, the ram-jet develops no static thrust. Therefore, this type of propulsion is foreseen for the cruise flight, combined with another type of jet power or booster rockets for take-off and climbing and landing.

The use of several types of propulsion units during the various phases of a flight results theoretically from the highest flight speeds. Experimental models and projects (X-15, Dyna-Soar, reactor tractor aircraft designs /Schleppflugzeug/) exhibit this uniform tendency. Because it is independent of take-off conditions, the propulsion unit used for crossing great distances at high cruise speeds will become increasingly similar to rocket propulsion units. Thus, certain problems of rocket technology are of interest for future air transport.

The basic trend is rocket development lies in producing a high-velocity discharge of mass from a jet. The intense heat needed for the agent and the thermodynamic conversion to direct kinetic energy constitute the major problems of rocket technology. Atomic energy satisfies the requirement for intense heat with low propulsion unit weight (without shielding), and it is no wonder that many designs have as their basis an atomic reactor. Figure 3 depicts a proposed design.

Liquid hydrogen is fed from a propellant tank to the discharge nozzle of a rocket combustion chamber. The combustion chamber itself is made up of a fission reactor. The hydrogen cools the nozzle walls, is vaporized and is finally fed through the reactor where it is heated greatly. Expansion /Entspannung/ takes place in the jet in the usual manner.

It is easy to see the conversion of this idea to a ram-jet unit for aircraft. It would seem that it would be necessary only to replace the hydrogen with the air rammed into the engine. The quantity of air needed would be determined by the proper dimensioning of the ram-jet, while the upper temperature range in the reactor would be determined by the temperatures permissible for the solid fuel used.

There are difficulties in heating the agent quickly enough with solid fuels which can provide this effect only by convection. The discharge temperatures attained by the gas must not much exceed 2000° K.

If one desires higher temperatures in the jet, then a gaseous fission material /Splatstoff/ in the form of very hot plasma must be used. Figure 4 shows an interesting design which was studied at Princeton University.

A light, cold agent -- for rockets hydrogen is again preferred -- is diffused through the heavy gaseious nuclear fuel. On the one hand this is held away from the center by centrifugal force and is thus kept from discharging, and on the other hand, it is separated from the solid container walls by the cold agent. In this way much higher temperatures can be attained than with solid nuclear fuel. The difficulty in this proposal lies in eliminating the danger of inhaling air containing gaseous radioactive fuel or nuclear fission products. Nevertheless, it is of the greatest technical interest. It shows the way in which a gaseous mass, heated to several ten thousands of degrees, can be controlled technically within a container in which the plasma is kept away from the solid walls by a cooling film which is constantly replacing itself.

The idea of the "hydrodynamic container" may be extended to an "electromagnetic reflector." This has come out of the fusion research where there is also the problem of enclosing very hot plasma within solid container walls.

If gases are heated to over 10^4 °K the atoms are noticeably ionized, that is, they are split into electrons and ions. The resultant gas plasma is about neutral since, in a sufficiently large volume, just as many negative as positive charges can be counted. However, it is possible by means of an atomic separation of the charges, to influence them by electromagnetic fields. The coil depicted in Figure 5, for example, produces a magnetic field which compresses a quantity of plasma, holds it away from the walls, and at the same time prevents it from escaping. The plasma forms a freely burning arc past which the agent can be conducted for heating.

If one compares plasma or arc heating in rockets or jet propulsion, then interesting features come forth which can be viewed as being advantageous to jet propulsion. In rocket propulsion one tries to discharge the whole jet cross-section, that is, the plasma itself, at an extremely high velocity. However, the energy needed for ionization cannot be regained as thrust; either it is discharged with the jet as lost energy or it reappears in the container walls, in the form of heat, as recombining energy for the reunited electrons and ions. It charges the wall and must be carried away by cooling. An improvement over the non-ionized jet would be in reducing the average molecular weight of the particles discharged.

In air transport jet propulsion the high discharge velocities required of rockets are not necessary, since with ram-jets we may restrict ourselves to a maximum speed of about Mach 5. As a result, the arch can burn at extreme temperatures in a relatively small cross-section, and it can be surrounded with a relatively cold agent like a jacketed fluid propulsion unit [Mantelstromtriebwerk] with a large cross-section. Through this principle it is

theoretically conceivable that the ionization energy contained in the plasma can be utilized as magnetic compression power for compressing and maintaining the plasma state. Foreign efforts have been in producing, by means of the ion stream, that is, fluid plasma, electric power in so-called "magnetohydrodynamic generators." This power can then be used again in building up magnetic fields.

E. Summary and Review of the Present Research Trends

Apart from the views mentioned below, for space flight special propulsion units such as ion or photon propulsion can be used. But the requirements of air travel in speed ranges up to Mach 5 will be well covered by the following developmental trends:

1. Producing propulsive energy in standard and modified solid fuel fission reactors, extracting energy from the working gases with or without the use of a heat exchanger, and utilizing the energy in conventional aircraft propulsion units.

In the present state of development, technical tests are being run on various power units on test stands. Because of the weight of the shielding, the use of these will be restricted to very large high-speed aircraft with extreme ranges.

2. Producing hot gas plasma, and heating and reflecting agents without the aid of heat exchangers in apparatus /Apparativ/ jet propulsion.

In the present state of development, research is being conducted on several technically feasible ideas in physical-technical laboritories. The testing stage is reported to be still at the point where basic problems are being defined. Developmental work has been directed toward:

a. producing hot gas plasma,
b. converting enthalpy in high heating by fluid /Stromung/ techniques.

Close cooperation with specialists in nuclear technology will be maintained in work on the possibilities mentioned under a. above, such as the production of plasma from gaseous nuclear fission fuels, the technology involved in producing pure β rays for heating gaseous agents, especially air, and also in producing electric energy directly from the nuclear process by using arcs.

The possibilities, treated in b. above, for the use of the high termal enthalpy which can be recovered from the arc, for the most part will be worked on separately from the processes mentioned in a. above. As Figure 6 shows, the source of energe is, at the research stage, irrelevant to the solution of this problem. To clarify most of the basic problems energy from stationary electrical machines can be used in place of the atomic energy which is to be used later. The results of wind tunnel tests on ram-jet propulsion units heated by arcs are of great interest to the aircraft industry, even if the form of future energy producers has not been determined in every detail.

FIGURE APPENDIX

M = 0.8

- - - Useful load G_N = 10 tons

—·—·— G_N/G_A = 0.20

——— G_N/G_A = 0.20 and G_A/F $f(G_A)$ for JL [Jet Liner ?] aircraft in service

• Aircraft computed at G_N/G_A = 0.20

G/F = 200 [kp/m²] 300 $G/F \neq$ structure 400 500 600

Take-off weight in tons G_A

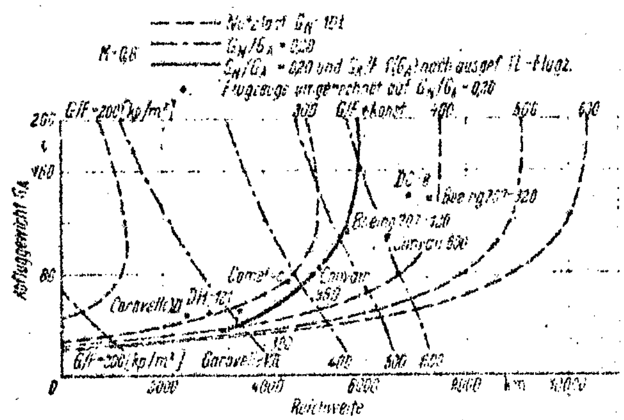


Bild 1: Reichweiten ausgeführter Flugzeuge bei Nutzlastanteil von 20 Prozent

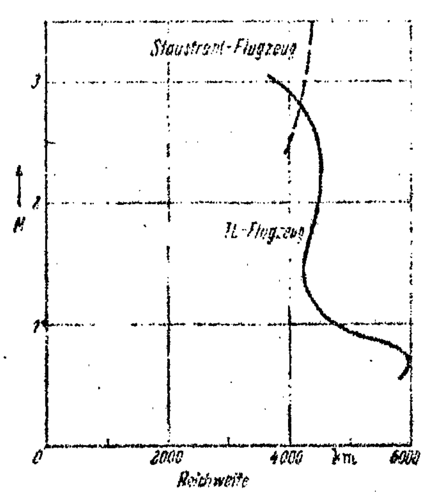
Range in kilometers

Figure 1. Ranges of aircraft in service, presuming percentage of useful load to be 20%.

Ram-jet aircraft

M

JL-aircraft [Unidentified abbreviation; possibly Jet Liner.]



$\frac{G_{Ble}}{G_A}$ = 0.45

Hu = 10,500 (kcal/

$\frac{G_N}{G_A}$ = 0.20

E ; η = f(M), according to Prof. Backhaus

G_{Ble}/G_A =
Hu = 1
G_N/G_A
nach Pro

Range in kilometers

Figure 2. Range dependent on Mach number.

Bild 2: Reichweite abhängig von der Machzahl

Pressure chamber
/Druckhaltefl/

Propellant

Control
rod

Reflector

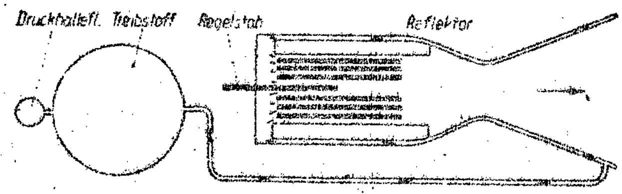


Bild 3: Kombination eines Feststoffspaltungsreaktors mit einer Strahldüse

Figure 3. Combination of a solid fuel fission reactor with a discharge nozzle.

Cold fuel
streaming
in

Liquid
propellant

Porosity and
film cooling

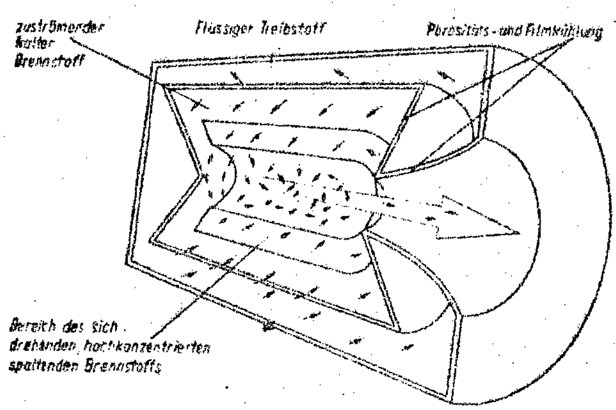


Bild 4: Hydrodynamische Plasmaabstrahldüse

Area of the whirling,
highly concentrated
fission fuel

Figure 4. Hydrodynamic Plasma Radiating Jet.

Fuel Vaporizer Magnetic Field Coil Propellant

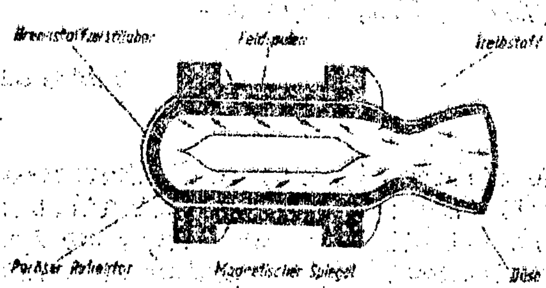


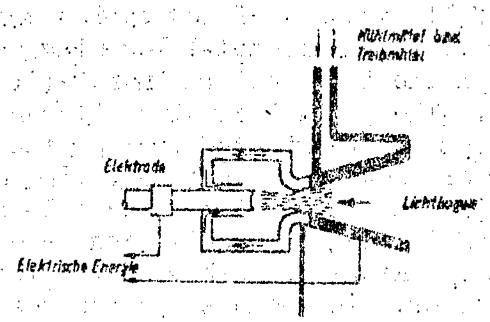
Bild 5: Magnetohydrodynamische Plasmakonzentrierung

Porous reflector Magnetic reflector Nozzle

Figure 5. Magnetohydrodynamic Plasma Concentration.

Coolant or propellant

Electrode Arc



Electrical energy

Bild 6: Lichtbogenheizung in einer Strahldüse

Figure 6. Arc heating in a jet nozzle.

II. THE NEWEST DEVELOPMENT IN CZECHOSLOVAK TRAINING AIRCRAFT - THE Z326 MASTER TRAINER -

Page 239 Unsigned article

Production in the aircraft plant in Otrokovice began over 25 years ago with the building of gliders and the first serially-produced sport plane, the Zlin XII. Since then, over 2,500 sport and training airplanes and over 1,000 sailplanes have left the plant.

For ten years it has produced a well-known trainer. The development of this trainer has progressed from the Z26 through the Z126, Z226B, Z226T, and Z226A to the newest version, the Z326 Master Trainer. An average of about 70% of the components are the same for all models. This is an extraordinary advantage from the standpoint of service and spare part supply for the operation of all models.

The Z326 is designed for basic training and for full stunt training. The seat of the first pilot is placed forward in the cabin. The aircraft is fully capable of aerobatics even with a maximum load of 900 kg. It is an all-metal low-wing monoplane with tandem seats. The engine is a Walter Minor 6-III equipped with an electric starter. The wings including ailerons and flaps and the fixed tail surfaces are fabricated from plated Dural sheet. The elevators and rudder are covered with linen. The upper and lower sections of the tail are fitted with detachable covers to facilitate the checking of the control cables and other equipment. The hand controls operate by means of push rods and the pedals, by means of push rods and cables. The pedals and the seats can be adjusted in flight to three positions. The landing gear can be retracted by means of an electric motor. The design of the oil circulation system and engine cooling make it possible to use this aircraft in tropical regions. The oil and fuel equipment permit trouble-free operation of the engine in all flight attitudes, including fairly long upside-down flight. The aircraft is equipped with an ultra-short wave radio unit for two-way communication; in addition, an intercommunication system is available. Besides the standard instruments, the instrument board has an artificial horizon of Czechoslovak manufacture, combined with a bank indicator. To extend its range, the aircraft can be equipped with aerodynamic, easily detachable auxiliary tanks mounted on the wing tips. These tanks hold a total of 70 liters.

The Z226 and Z326 aircraft have excellent flight characteristics and performance. Compared to other aircraft in this category they rank first on a world scale. They have exceptionally good recovery characteristics in stalls and loss of airspeed if the aircraft sheuld stall out at full up-elevator; they are easy to

control in any aerobatic maneuver. These characteristics increase flight safety. Proof of this is in the operational experiences had with over 500 planes of this type and in the results of the international aerobatic contest for the Lockheed Trophy. In 1956 a Zlin aircraft piloted by Blaha took second place in this contest and in 1957 the competition was won by a Zlin piloted by Beseda. In 1958 a Zlin trainer piloted by Biancotto won the competition, Beseda took second place and another Zlin took fourth place. The champion aerobats of Czechoslovakia use the Zlin trainers exclusively. A predominant part of the aircraft entered in the 1960 World Aerobatic Meet now being prepared are Zlin trainers.

Today these trainers are flying in the most varied assortment of countries, for instance, in the German Democratic Republic, in Belgium, in Switzerland, in Austria, Poland, Rumania, Finland, USSR, Czechoslovakia, in the UAR, Yemen, Vietnam, Australia and in West Germany.

Technical Data of the Z326 Master Trainer

Engine power	160 hp
Span	10.582 m.
Wing area	15.5 sq. m.
Length	7.83 m.
Height	2.06 m.
Maximum flight speed near ground level	245 km/h
Cruising speed at 70% of full power	215 km/h
Rate of climb from gound level	4.5 m/s
Service ceiling	4800 m
Take-off run	250 m
Landing run	165 m
Range	650 km
Range with auxiliary tanks	1000 km
Weight empty	637 kg
Empty plus fixed weight/Rustgewicht/	900 kg

III. THE CHEMICAL PROGRAM AND THE AIRCRAFT INDUSTRY
- East Germany -

Pages 249-250 D. Wesser, Pirna

A. The Significance of the Chemical Industry to the GDR Economy

The German Democratic Republic has a well-developed chemical industry which accounts for about 14.5% of the total industrial production.

In absolute production we stand seventh in the world, however, in per capita production, we are second only to the USA. Stemming from this fact are very favorable conditions which make the chemical industry of our republic a central point in the building up of industrial production shown in the long-term economic plan. By 1948 we had again attained the prewar level; gross production was doubled in the First Five-Year Plan (1950-1955); and, for all practical purposes, at the end of the Second Five-Year Plan gross production will be 400% that of 1936. As a result of this latter fact, our annual rate of growth in recent years has exceeded the world average.

B. The Chemical Program and the Chemical Conference

After the Fifth Party Congress of the German Socialist Unity Party had shown the way for the triumph of socialism in the GDR, the objectives for solving the major economic tasks were defined; the development of the chemical industry was at the core of the problem. Accordingly, in preparing the first Seven-Year Plan the chemical industry was placed at the core of the industrial build-up of the Republic. Work conducted jointly by the scientists and technicians of the plants and of the state organizations produced a "chemical program" the goals of which were set through 1965.

TABLE 1

Survey of Planned Production Increases up to 1965 for the More Important Chemical Products

	1958 (t)	1965 (t)	Percent
Sulfuric acid	530,800	1,060,000	199.7
Soda	552,900	730,000	132.0
Caustic soda	296,400	440,000	148.4
Carbide	830,700	1,200,000	144.5
Ammonia	365,300 N*	425,000 N*	116.5
Nitrogen fertilizer	320,000	362,000	113.1
Phosphorous fertilizer	137,600	250,000	181.7
PVC powder	54,600	120,000	219.8
Synthetic rubber	83,800	113,000	143.8
Polystyrol	3,600	20,000	555.6
Fuels, total	2,030,000	4,450,000	219.2
Fine polyamide silk	1,500	6,500	433.3
Polyamide fibers	2,500	3,700	148.0

* [net ?]

In order to insure that the extensive investments -- for instance, 8.6 billion DM are available for the period 1961 to 1965 -- would be carried out, it is necessary to have a reconstruction on every side and active and organized aid and cooperation from every branch of industry. Therefore, at the first Chemical Conference held in Leuna on 3 and 4 November 1958, the cooperation of all industrial branches of the economy was advised for the fulfillment of the chemical program to set an example of the organization of this type of complex planning and plan execution. The impetus which came from this conference with the slogan "Chemistry Gives Bread, Prosperity and Beauty" led to significant results observed in 1959.

C. <u>What Can the Aeronautical Industry Expect from this Program?</u>

The chemical program of the GDR has as its major goals the rapid development of the production of modern plastic materials and synthetic fibers and the making available to us the production from the newly discovered raw materials, namely, petroleum. These are the most significant items of immediate interest in building modern passenger aircraft and the materials, fuels, instruments and equipment for them. Although the quantities of these materials required for the aeronautical industry come under other branches of the machine building industry or other "consumers," the lack of

such chemical products will present a problem to the aircraft builder in attaining his set goals, such as the lightest possible construction consistent with safety and comfort. (Unfortunately, the chemical industry in some cases still has not recognized the very high degree of improvement in aircraft for export so that it sometimes does not support the often small, but very specialized requirements of the aircraft industry and it does not insure that these requirements will be satisfied.)

The use of plastics strengthened with glass fibers for interior equipment, paneling, skin /Behautung/, and antennae covering will result both in savings of weight in the interior, and in real advantages in production technology for these items. The plastics needed for these items and also low-alkali glass products are included in the individual points of the over-all plan. Foam plastics which are to be in production by 1965 offer a valuable material for cabin insulation and, to a degree, construction combining light-weight materials with metallic or non-metallic surfaces. Beyond the improved hard PVC foam plastic types and the fire-resistant polystyrol foam in which the aircraft industry is already interested, there is great interest in soft polyurethane foam for upholstery and in the use of foam layers which can be sprayed into place within the cabin.

There is no doubt that such products as polyethylene and PVC and the many flat and tubular semi-finished products which are expected to be made from them will be used for various special-purpose equipment and fittings in the most modern aircraft types.

There are many raw materials which will be available from the chemical producer plants which are not to be underestimated. These products will permit a significant improvement in quality in paints, glue and rubber materials for the respective supplier industry of our branch of the economy. In particular, the production of silicon rubber and other types of synthetic rubber must find further application in rubber shapes, profiles, and jointing materials for sealing integral tanks; it will also meet the rising requirements of flight operations at temperatures ranging from -60° C to + 80° C.

The essential extension of chemical fibers to include polyamide and polyterephthalate (Lanon) base, to be concentrated on at the new chemical fiber combine in Guben, will mean that future requirements of the aircraft industry will have a basis for orienting the supply of improved covering materials for sailplane construction, for "light" textiles for fittings and high-grade binding material for plastic coverings. In addition, these new, light and strong textiles will provide a chemical base for our industry to improve the quality of rubberized fabrics, high-pressure hose, tires, etc.

The area of "chemical metals," that is, the non-ferrous metals branch, which for the most part produces metals (primarily

light metals) by electrolytic smelting processes, is also undergoing a significant expansion of production. The production of aluminum is to be increased and the production of magnesium is to be begun.

To waste words in this magazine in the importance of aluminum and magnesium and their alloys to the aircraft industry would indeed be carrying coals to Newcastle.

The supply of the carbon needed in the above-mentioned organic chemicals will be complemented by petroleum, thanks to the generous aid of the Soviet Union. The pipeline being built from the USSR across Poland to the GDR will carry 6 million tons of petroleum annually; most of this will be processed at the new refinery being built at Schwedt an der Oder. Besides various basic materials for high-molecular chemistry, not only will just large quantities of energy sources such as heating oil and fuels be regained from this stream of petroleum, but in addition there will be changes, especially in the qualitative structure, in aircraft fuels which will make available, for instance, turbine fuels with reduced aromatic contents.

The chemical program will bring changes not only to the chemical raw materials industry, but in many ways it will force special efforts in metallurgy, machine and instrument building, measuring and control production and the construction industry. Therefore, we as aircraft builders must consider in our complicated cooperative relationships specific qualitative and quantitative improvements in the parts and products supplied to us. The mass initiatives for joint socialist work pronounced at the Second Industrial Branch Conference for the Aeronautical Industry, in the final analysis, had their basis in the decisions which came out of the First German Chemical Conference. Thus, it must be recognized that the character of the Chemical Conference agrees with the political conditions of the struggle for peace and with the firm principle of developing fully all creative capabilities in our activities.

D. Prospects and Perspectives

The requirements of the aeronautical industry for the coming year for the materials, fuels and auxiliary agents mentioned above must be condensed further with regard to quality and quantity. On the one hand this will present to the chemical industry clear concepts of the technical qualitative requirements, and on the other hand, it will enable us to see promptly the gaps where the requirements of the aircraft industry are not covered. In such cases, according to the decisions of the Chemical Section of the Council for Mutual Economic Aid, the requirements for a few special materials are to be covered by imports. Too, according to the organizations of the GDR Council for Research /Forschungsrat/

concerned with the problem, the preparation for the development domestically of new chemical materials and auxiliary products is going on continuously in order that the new problems arising from the expected breaking of the Mach 1 barrier in passenger travel can be solved by the proper selection of materials.

Finally, I wish to express the hope that the aircraft industry will not be just on the receiving end of the results of chemical programs, but that it will render real aid to the chemical industry in given areas, for instance, in the development of instruments for control technique needed in the great task of automation in the chemical industry. And there is real significance in strengthening the cooperation between the socialist countries in the field of aeronautical materials. It will simplify the unfortunate problem of "prescription amounts" in our economy in such a way that specific materials (for instance, aircraft industry materials) can be planned and developed so that the needs of all socialist countries with domestic aircraft industries can be covered.

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East Germany CSO: 4875

INFLUENCE OF METEOROLOGICAL FACTORS ON THE HARVEST YIELD OF THE MOST IMPORTANT PLOWED CROPS

[Following is a translation of an article by Laszlo Pinter from a German-language periodical Angewandte Meteorologie (Applied Meteorology), Vol. III, No. 3, Berlin, April 1958, pages 77-92.]

We investigated the average harvest yield of wheat, maize, rye, potato, sugar beets and oats during the period 1920-1954 in Pest County. In addition, we observed the correlation between meteorological factors during the season of vegetation as well as their force and periods.

During the course of these studies we found the following connections between meteorological factors and plants on which we completed multiple correlation calculations:

Wheat: $R = 0.9398 \pm 0.016$, Maize: $R = 0.901 \pm 0.023$,
Rye: $= 0.757$

In the case of rye it might be possible to arrive at more accurate results through more detailed calculations.

Since there are such close connections, the results of the calculations might be used in various fields. The most important of these are:

1. Crop estimates.
2. Regional cultivation.
3. Regional agrotechnics, plant cultivation.
4. Determining production levels.

It would serve a useful purpose to undertake such calculations for various regional units. The results and applicability of these calculations might be extended with due regard to phenological data.

We examined the connection between the various weather elements and the harvest yield of the most important plowed crops on the territory between the Danube and the Tisza in the former county (District) of Pest-Pilis-Solt-Kiskun, hereafter Pest County. Our observations cover the period 1920-1954. Data relating to 1943, 1944, 1945 and 1946 were not considered due to war events and unsatisfactory meteorological observations. In consequence, the number of years included amounts to 31. The following plants were observed:

Name of Plant	Proportion of Acreage of the Plant To Total Crop Acreage of County (%)	To National Acreage of Plants (%)
Winter Wheat	16.6	7.9
Winter Rye	24.8	25.1
Maize	23.6	13.8
Potatos	4.8	13.7
Oats	2.6	8.8
Sugar Beets	1.1	6.6
Total	73.5	--

Of the three main meteorological factors air temperature was observed and taken into consideration at three stations, duration of sunshine at one, and the amount of precipitation at ten stations. The data was compounded on the basis of 5-year periods; correlation calculations, however, are relating to 10-year periods shifted by 5 days.

We proceeded in the same manner with the graphs. In consequence the first date in May includes the period 1 to 10 May, the second date the period 6 to 15 May. It was necessary to use this method, because 5-day changes may occur easily even under relatively normal weather conditions, therefore, results calculated on the basis of 10-year periods are far more reliable. In general agrotechnics applied in the case of plants were not considered in our observations, due to lack of data. Although these factors have an influence on the shaping of harvest results, we could not speak of a change of decisive quality in agrotechnics likely to influence the field of a large acreage during the period of our observations. It would be necessary, however, to extend the calculations in this direction, in particular for the more recent periods.

Connections were examined with the help of correlation calculation. As a first step, we established the critical periods of the complete vegetation season for each plant by means of probability correlation. The critical period is defined here as the time during which the connection between a meteorological element and the harvest result stronger than I 0.3 amounts to (R 0.3). Probability correlation is especially suited to problems of this type. It is easy to manipulate, requires relatively less calculations and produces the actual non linear connections often more accurately than correlation calculations based on quadratic deviations. In the following, we executed multiple correlation calculations of the critical periods determined on the basis of

probability correlation calculation. The forces determined on the basis of the probability correlation were justified in most cases by the calculations based on quadratic deviations. The terms applied by Bogardi (4) were used for the results of the multiple correlation calculations.

Meaning of the terms used in the following discussion:

R^2 = Square of the correlation coefficient.

R = Square root of R^2, a value indicating the force of the connection.

σy = Quadratic deviation of the dependent variable.

b = Partial moment indicating the change of the dependent variable (y) resulting from change by one unit (x) of the independent variable.

c = A measuring figure, indicating for each variable to what extent it is participating in the formulation of the value of the dependent variable.

E(Y) = Definition of the final results in the calculations.

Besides determining connection multiple correlation calculation provides results applicable in practical life - we will elaborate this later. In order to introduce the largest number of independent variables (meteorological factors) in our calculations we determine first the average harvest yield of each plant under the influence of different meteorological factors (e.g., we based our calculations exclusively on the critical temperature) and interpreted the average harvest yields thus obtained as independent variables in our final calculations. Thus, it was possible considerably to extend the number of independent variables, (in our case to a maximum of three times, in wheat four times.) In addition, it was possible with the help of this method, to establish the relative weight of each meteorological factor influencing the harvest yield: these will be presented also with each result.

Regarding harvest yields of wheat, rye and maize, we completed multiple correlation calculations on the basis of probability correlation, in consequence we are in a position to indicate the multiple correlation calculations, in addition to results of probability correlations. These plants cover 65% of the acreage in the country; in the case of potatoes, sugar beets, and oats results will be presented only on the basis of probability correlations. Percentage of the acreage in the case of the three later named plants amounts to 8.5%.

Wheat (Graph 1)

Although, in general between the Danube and the Tisza winter wheat is not sown until mid-October, we started our calculations in September.

Graph 1. Correlation between the yield of winter wheat and meteorological elements.
..... Temperature ——— Precipitation ——— sunshine

As already mentioned during the general discussion of the method employed, the average harvest yield was first correlated separately with meteorological factors -- for example, with temperature -- and the final calculations were completed with multiple correlations.

Regarding the duration of sunshine, the following critical periods were taken into consideration:

Y = Average harvest yield of Pest County
X_1 = Duration of sunshine from 26 November to 10 December.
X_2 = Duration of sunshine from 10 to 20 December
X_3 = Duration of sunshine from 16 to 28 February.
X_4 = Duration of sunshine from 1 to 10 April.

The force of correlation between duration of sunshine and average harvest yield of wheat is as follows:

$R = 0.5356$ and thus $R = 0.731$ and the spread involved in the calculated average harvest yield amounted to:

$\sigma_y = 0.796q$, or 10.9%.

We obtained 6 following important results:

$b_1 = 0.0544$	$c_1 = 0.1936$ or 36.2%
$b_2 = -0.0340$	$c_2 = 0.1265$ or 23.6%
$b_3 = 0.0114$	$c_3 = 0.1416$ or 27.3%
$b_4 = 0.0208$	$c_4 = 0.1416$ or 27.3%
$a^4 = 4.93$	$\sum c^4 = 0.5354$ or 100%

Since $\sum c$ was approximately the same as R^2 our calculations were correct.

Yearly average harvest yield on the basis of sunshine duration was calculated with the help of the following equation:

$$E(Y) = 4.93 + 0.0544X_1 - 0.0340X_2 + 0.0114X_3 + 0.0208X_4$$

The critical periods considered in determining temperature were the following:

Y = Harvest yields average of Pest County
X_1 = Temperature between 13 and 17 September.
X_2 = Temperature between 21 and 30 January.
X_3 = Temperature between 11 and 20 April.
X_4 = Temperature between 6 May and 4 June.

The strength of correlation is:
$R^2 = 0.4946$ corresponding to $R = 0.703$
The quadratic deviation is:
$\sigma_y = 0.8319$ or 11.37%.
Important results:

b_1	=	-0.1354	c_1	=	0.1532 or 31%
b_2	=	0.0567	c_2	=	0.0465 or 9.4%
b_3	=	-0.0632	c_3	=	0.0375 or 7.6%
b_4	=	-0.2991	c_4	=	0.2576 or 52%
a	=	15.69	$\sum c$	=	0.4948 or 100%

The equation for the calculated harvest yield is:

$$E(Y) = 15.69 - 0.1354X_1 + 0.0567X_2 - 0.0632X_3 - 0.2991X_4$$

The following periods were considered in connection with precipitation:

Y = Harvest yield average of Peat County
X_1 = Precipitation between 11 and 20 September.
X_2 = Precipitation between 1 and 10 April.
X_3 = Precipitation between 16 and 31 May.

The strength of correlation results are:
$R^2 = 0.4095$ equaling $R = 0.639$.

The spread involved amounts to:
$\sigma_y = 0.8989$ or 12.3%

b_1	=	0.0289	c_1	=	0.1208 or 29.4%
b_2	=	-0.0381	c_2	=	0.2046 or 49.9%
b_3	=	0.0183	c_3	=	0.0849 or 20.7%
a	=	6.99	$\sum c$	=	0.4103 or 100%

The average harvest yield calculated on the basis of precipitation was the following during the period under consideration:

$$E(Y) = 6.99 + 0.0289X_1 - 0.0381X_2 + 0.0183X_3$$

As regards wheat, certain agrotechnical factors, such as the extent of damage caused by weather, were also taken into consideration. In this group, labelled collectively as "agrotechnical factors," we considered three factors. Regarding wheat, organic and artificial fertilizers, on which data were available during the period of our investigations, had a considerable influence on shaping harvest yield averages. Organic manure was considered in relation to the density of livestock. On the other hand artificial fertilizers were considered on the basis of the amount of phosphor-fertilizer per cadastral yoke [57.55 acre] arable land. Thus, agrotechnical factors in the struct sense (organic and artificial fertilizer) were included in the calculation by means of certain indirect index numbers, therefore they are not as exact and characteristic as the examination of meteorological factors. The relation of damages by weather conditions was also calculated by means of indirect index numbers.

In determining the effects of agrotechnical factors, following coefficients are to be considered:

Y = Harvest yield average in Pest County.
X_1 = Amount of phosphor-fertilizer per cadastral yoke.
X_2 = Extent of weather damage.
X_3 = Density of livestock per cadastral yoke arable land.

Thus: $R^2 = 0.3516$, $R = 0.593$, $\sigma_y = 0.9419$, or 12.89%
and for:

b_1	=	0.0854	c_1	=	0.1598 or 45.5%
b_2	=	- 0.2981	c_2	=	0.1623 or 46.2%
b_3	=	0.0462	c_2	=	0.0294 or 8.3%
a	=	6.08	Σc	=	0.3515 or 100%

As a result of these calculations we obtained the following equation:

$$E(Y) = 6.08 + 0.0854X_1 - 0.2981X_2 + 0.0462X_3$$

We would like to mention in connection with the investigations by means of agrotechnical factors, that their scope should be extended in the future. Considered carefully, other factors should be included (rotation of crops, type of crop cultivated, etc.) which can be evaluated numerically. Our calculations on the subject are promising good results.

After establishing the final results, we proceeded to determine the yearly average crop yield by means of the above equation. We also included it as independent variable in our final calculations.

- Y = Average harvest yield in Pest County
- X_1 = Average harvest yield calculated on the basis of temperature.
- X_2 = Average harvest yield calculated on the basis of precipitation.
- X_3 = Average harvest yield calculated on the basis of agrotechnics.
- X_4 = Average harvest yield calculated on the basis of duration of sunshine.

As a result of our calculations we obtained the following equation:

$$E(Y) = -4.21 + 0.3692X_1 + 0.2383X_2 + 0.4286X_3 + 0.5395X_3$$

The correlation coefficient:

$$R^2 = 0.7517 \text{ and } R = 0.866$$

The conditional quadratic deviation of the average harvest yield is as follows:

$$\sigma_y = 0.5829 \text{ which equals } 7.945\%$$

Important results:

b_1	=	0.3692	c_1	=	0.2125 or 28.3%
b_2	=	0.2383	c_2	=	0.0973 or 13%
b_3	=	0.4286	c_3	=	0.1523 or 20.3%
b_4	=	0.5395	c_4	=	0.2878 or 38.4%
a	=	- 4.21	Σc	=	0.7499 or 100%

The proportion by which factors included in our calculations influenced harvest yields was as follows: temperature 28.3%, agrotechnics 20.3% and the duration of sunshine 38.4%. The weight of harvest yield formation of each coefficient according to values of c amounts to:

Temperature:

13 - 17 November	8.7%
21 - 30 January	2.6%
11 - 20 April	2.2%
6 May - 4 June	14.7%

Agrotechnical factors:

Organic manure	1.7%
Artificial fertilizer	9.2%
Damage by weather	9.4%

Precipitation:

11 - 20 September	3.8%
1 - 10 April	6.5%
16 - 31 May	2.7%

Duration of sunshine:

26 November - 10 December	13.9%
10 - 20 December	9.1%
16 - 28 February	5.0%
1 - 10 April	10.5%

These relative distribution figures, indicating the harvest yield weight of each factor introduced in the calculations, (we shall make use of this expression in the following) will have a special meaning in determining the regional cultivation.

One reason for executing these calculations was the investigation concerning the yearly changes of the national harvest yield averages. Regarding wheat and maize Pest County shows the closest connection with the average national harvest yields.

In the case of wheat, the correlation coefficient between the average harvest yield in Pest County and the country as a whole is as follows: $R = 0.927 \pm 0.017$.

Since there is such close connection between the harvest yield averages of both territories, we calculated national production on the basis of harvest yield calculations in Pest County. The correlation coefficient between the actual average wheat production of the country and the average calculated on the basis of the harvest yield in Pest Count is as follows:

$$R = 0.8497 \pm 0.034$$

It is evident, that the force of the connection differs with 0.016 only from Pest County, as established on the basis of factors included in the calculations. The returns in Pest County adequately reproduce national conditions.

We observed during the course of the investigations, that each year under- and over-estimates between the figures of calculated and actual harvest yield appeared with a certain regularity. To determine the cause of this behavior we used the method of harmonic analysis; but application of this method in this connection should be subject to further investigations. The

application of harmonic analysis for corrections of this type gave rise to the same seven-year rhythm, which Zoltan Berkes (12) was able to demonstrate in connection with the May frosts.

In the case of wheat, too, there occurs the seven-year cycle of a considerable variance between the estimated and the actual average yields. It is easy to see why the two identical time cycles coincide. The correlation coefficient of the air temperature in May constitutes a converse indicator, i.e., the cooler the month of May, the larger the wheat crop which may be expected. There is, of course, a minimum temperature beyond which the benefits from lower temperatures cease, and below which crops will suffer damage. As a consequence, the seven-year recurring cycle, appearing in both calculations, is dependent upon the effect of the sub-minimum temperature. As we have previously noted, the harvest-yield weight of the air temperature in May amounts to 14.7%, and is therefore the most important of all the factors involved.

As a result of the correction made on the basis of the harmonic analysis, the correlation coefficient between the estimated and the actual average wheat yield (Graph 2) is:

$$R = 0.9338 \pm 0.016.$$

It should be noted that this method can and should be further refined.

<u>Maize</u> (Graph 3)

Based upon the critical periods, as determined by the individual meteorological factors, we undertook additional correlation computations similar to those we had made in the case of wheat.

Graph 2. Actual and Calculated Yield of Winter Wheat (——— actual average yield, ---- calculated average yield)

Graph 3. Correlation between the yield of Maize and various meteorological elements. (-------temperature, ——— precipitation, ———duration of sunshine.)

In the case of temperature the following periods came into consideration:

Y = Harvest yield average in Pest County
X_1 = Temperature between 26 May - 9 June.
X_2 = Temperature between 20 - 24 June.
X_3 = Temperature between 10 - 14 July.
X_4 = Temperature between 21 - 25 April.

As a result of our calculations we obtained following equation:

$$E(Y) = 21.58 - 0.5061X_1 + 0.3079X_2 - 0.2635X_3 - 0.2444X_4$$

The strength of correlation was:

$$R^2 = 0.4424, \; R = 0.665$$

The conditioned quadratic deviation of the calculated average harvest yield:

$$\sigma_y = 1.92q \text{ or } 21.3\%$$

Important results:

b_1	=	-0.5061	c_1	=	0.1324 or 30%
b_2	=	0.3079	c_2	=	0.1226 or 27%
b_3	=	-0.2635	c_3	=	0.0728 or 17%
b_4	=	-0.2444	c_4	=	0.1127 or 26%
a	=	21.58	Σc	=	0.4405 or 100%

In regard to precipitation the following factors were taken into consideration:

Y = Harvest yield average of Pest County
X_1 = Precipitation between 26 April and 15 May.
X_2 = Precipitation between 26 May and 10 June.
X_3 = Precipitation between 16 June and 5 July.

Based on these factors we obtained the following equation:

$$E(Y) = 5.60 + 0.0144X_1 + 0.0561X_2 + 0.0245X_3$$

The strength of correlation was:

$$R^2 = 0.4070, \quad R = 0.638$$

The conditioned quadratic deviation:

$$\sigma_y = 1.981q \text{ or } 22.01\%$$

Important results:

b_1	=	0.0144	c_1	=	0.0355 or 9%
b_2	=	0.0561	c_2	=	0.2587 or 63%
b_3	=	0.0245	c_3	=	0.1127 or 28%
a	=	5.60	Σc	=	0.4069 or 100%.

Regarding the duration of sunshine the following critical periods occurred:

Y = Harvest yield average of Pest County.
X_1 = Duration of sunshine from 26 May to 10 June.
X_2 = Duration of sunshine from 21 to 31 August
X_3 = Duration of sunshine from 11 to 20 September.

The equation for calculating the harvest yield average is:

$$E(Y) = 18.16 - 0.0502X_1 - 0.0254X_2 + 0.0099X_3$$

Correlation Coefficient:

$$R^2 = 0.3700, \quad R = 0.616$$

The conditioned quadratic deviation of the calculated harvest yield average:

$$\sigma_y = 2.04q \text{ or } 22.7\%$$

Other results:

b_1	=	-0.0502	c_1	=	0.3095 or 84%
b_2	=	-0.0254	c_2	=	0.0477 or 13%
b_3	=	0.0099	c_3	=	0.0129 or 3%
a	=	18.16	Σc	=	0.3701 or 100%

Since no suitable data were available, agrotechnical factors could not be considered during the period of investigation. It would be extremely desirable to include in these calculations at least the extent of cultivation measures, particularly in regard to maize and possibly for hoe plants. However, such data could be established in certain cases only and merely for the most recent periods, thus they are not included in our calculations.

Further calculations were undertaken on the basis of harvest yield averages determined by the three meteorological factors -- as in the case of wheat.

Y = Harvest yield average in Pest County
X_1 = Average harvest yield calculated on the basis of temperature.
X_2 = Harvest yield average calculated on the basis of precipitation.
X_3 = Harvest yield average calculated on the basis of the duration of sunshine.

Thus the equation for the calculated harvest yield average is as follows:

$$E(Y) = -3.79 + 0.6963X_1 + 0.4395X_2 + 0.2606X_3$$

The strength of correlation is:

$$R^2 = 0.5844, \quad \text{or } R = 0.763$$

The conditioned quadratic deviation of the calculated harvest yield average:

$$\sigma_y = 1.6589 \quad \text{or} \quad 18.4\%$$

Important results:

$b_1 = 0.6963$		c_1	=	0.3082 or 53%
$b_2 = 0.4395$		c_2	=	0.1798 or 31%
$b_3 = 0.2606$		c_3	=	0.0964 or 16%
$a = -3.79$		$\sum c$	=	0.5844 or 100%

Thus the average yield of maize in Pest County was affected up to 53% by temperature, 31% by precipitation and 16% by the duration of sunshine during the period of investigation. The weight of harvest yield results was the following during each period:

Temperature:

26 May - 9 June	15.9%
20 - 24 June	14.3%
10 - 14 July	9%
21 - 25 April	13.8%

Precipitation:

26 April -15 May	2.8%
26 May - 10 June	19.5%
16 June - 5 July	8.7%

Duration of sunshine:

26 May - 10 June	13.4%
21 - 31 August	2.1%
11 - 20 September	0.5%

Similarly as in the case of wheat we observe the same closest connection between the national harvest yield averages for maize and the average harvest yield in Pest County.

In consequence we projected the calculated harvest yield to the national scale and the correlation coefficient between the actual andthe calculated national harvest yield was as follows:

$$R = 0.760 \pm 0.051$$

These results agree completely with those obtained in Pest County, therefore we might consider the evaluation of national harvest yield as correct.

Graph 4. Actual and Calculated Yield of Maize.
(——— actual harvest yield average,
------- calculated harvest yield average)

In the case of maize national yields were corrected also by means of the harmonic analysis. The strongest periods wer observed for the 14th (= 2 x 7) and for the 12th year.

Following the correction (Graph 4) the correlation coefficient was:

$$R = 0.901 \pm 0.023$$

The tendency of the calculated harvest yield average deviated merely (above or under the average) during one single year, 1920 from the actual average.

Rye (Graph 5)

As in the case of wheat and maize, we used for rye the multiple correlation calculations. Correction in this case could not be applied as of this date, therefore, we obtained a weaker connection here. In the case of rye, we executed the calculations also first on the basis of temperature, then on the basis of precipitation and duration of sunshine.

Graph 5. Correlation between the yield of winter Rye and Various Meteorological factors.
(----- temperature, _ _ _ _ precipitation,
——— duration of sunshine).

The following data were considered in connection with the temperature:

Y = Harvest yield average of Pest County
X_1 = Temperature from 6 - 15 January.
X_2 = Temperature from 26 January to 4 February.
X_3 = Temperature from 26 May to 4 June.

The equation for determining the harvest yield is as follows:

$$E(Y) = 9.28 + 0.0528X_1 + 0.0241X_2 + 0.1794X_3$$

The strength of the connection:

$$R^2 = 0.3980, \quad \text{or } R = 0.631$$

The conditioned quadratic deviation of the calculated harvest yield average:

$$\sigma_y = 0.64q \text{ or } 11.03\%$$

Important results:

b_1	=	0.0528	c_1	=	0.0854 or 21.5%
b_2	=	0.0241	c_2	=	0.0542 or 13.6%
b_3	=	-0.1794	c_3	=	0.2579 or 64.9%
a	=	9.28	$\sum c$	=	0.3975 or 100%

In the case of precipitation calculations were made on the basis of the following periods;

Y = Harvest yield average of Pest County
X_1 = Precipitation between 11 and 20 September
X_2 = Precipitation between 11 and 25 December
X_3 = Precipitation between 1 and 10 April
X_4 = Precipitation between 16 and 31 May.

The final equation was:

$$E(Y) = 5.31 + 0.0153X_1 + 0.0238X_2 + 0.0087X_3 + 0.0069X_4$$

The correlation coefficient is:

$$R^2 = 0.1912 \text{ or } R = 0.437$$

The conditioned quadratic deviation

$$\sigma_y = 0.74q \text{ or } 12.76\%$$

Important results:

b_1	=	0.0153	c_1	=	0.0590 or 30.8%
b_2	=	0.0238	c_2	=	0.713 or 37.2%
b_3	=	0.0087	c_3	=	0.0304 or 15.9%
b_4	=	0.0069	c_4	=	0.0309 or 16.1%
a	=	5.31	Σ c	=	0.1916 or 100%

Results of calculations based on duration of sunshine:

Y = Harvest yield average in Pest County
X_1 = Duration of sunshine from 11 to 31 December
X_2 = Duration of sunshine from 15 to 25 March
X_3 = Duration of sunshine from 1 to 10 April
X_4 = Duration of sunshine from 21 May to 5 June
X_5 = Duration of sunshine from 11 to 20 June

The equation based on the calculations is as follows:

$$E(Y) = 6.16 - 0.0187X_1 + 0.0052X_2 + 0.0072X_3 - 0.0105X_4 + 0.0110X_5$$

The strength of connection:

$$R^2 = 0.4593 \quad \text{or} \quad R = 0.677$$

The conditioned quadratic deviation:

$$\delta = 0.605q \quad \text{or} \quad 10.52\%$$

Important results:

b_1	=	- 0.0187	c_1	=	0.1284 or 27.7%
b_2	=	0.0052	c_2	=	0.0323 or 7%
b_3	=	0.0072	c_3	=	0.0689 or 14.8%
b_4	=	- 0.0105	c_4	=	0.1241 or 26.8%
b_5	=	0.0110	c_5	=	0.1089 or 23.7%
			Σ c	=	0.4635 or 100%

The results of the final calculations based on the three meteorological factors observed is as follows (Graph 6):

Y = Harvest yield average in Pest County
X_1 = Harvest yield average calculated on the basis of temperature
X_2 = Harvest yield average calculated on the basis of precipitation
X_3 = Harvest yield average calculated on the basis of duration of sunshine.

The equation for determining the harvest yield average is as follows:

$$E(Y) = -2.49 + 0.5672X_1 + 0.1732X_2 + 0.6895X_3$$

The correlation coefficient is:

$$R^2 = 0.5739 \text{ or } R = 0.747$$

Graph 6. Actual and calculated yields for Winter Rye.
(———— actual harvest yield average,
-------- calculated harvest yield average.)

The conditioned quadratic deviation:

$$\sigma_y = 0.54q \text{ or } 9.3\%$$

Important results:

b_1	= 0.5672	c_1	= 0.2249 or 38.8%
b_2	= 0.1732	c_2	= 0.0309 or 5.3%
b_3	= 0.6895	c_3	= 0.3238 or 55.9%
a	= − 2.49	Σc	= 0.5796 or 100%

It could be established as a result of these calculations that in the development of the harvest yield, the participation of temperature is 38.8%, precipitation 5.3% and duration of sunshine 55.9%

We are giving the weight of harvest yield formation of each coefficient:

Temperature:

From 6 to 15 January	8.3%
From 26 January to 4 February	5.3%
From 26 May to 4 June	25.2%

Precipitation

From 11 to 20 September	1.6%
From 16 to 25 December	2.0%
From 1 to 10 April	0.8%
From 16 to 31 May	0.9%

Duration of sunshine:

From 11 to 31 December 15.5%
From 16 to 25 March 3.9%
From 1 to 10 April 8.3%
From 21 May to 5 June 15%
From 11 to 20 June 13.2%

Percipitation has relatively small influence on the formation of harvest yield averages. This points to the fact, that there is sufficient precipitation available in this area to produce good harvest yields.

We used the multiple correlation calculation regarding the harvest yield average of wheat, maize and rye. It is obvious from the results of these calculations, that a very close connection might be established between the harvest yield averages and the changes in each weather factor. These results should be considered, however, merely as first steps leading to further investigations. Even the methods of calculation should be further developed. Further, it is necessary to include phenological observations. In additaon soil moisture, snow covering and other important agrotechnical factors should be considered as independent variables in the calculations. Regarding corrections, the number of waves in the harmonic analysis should be increased. Obviously, the calculations could not be considered as conclusive, not even regarding the three plants discussed. They should be interpreted merely as part of an extended investigation.

These results offer possibilities for the extension of agrometeorological investigation in common with observations of the local climate affecting plants and their periodicity.

In the following, we propose to discuss -- on the basis of probability correlations -- results obtained in the case of potatoes (Graph 7), Sugar beets (Graph 8) and oats (Graph 9). In these cases, the results of the multiple correlation calculations were not available as yet.

Graph 7. Correlation Between Harvest Yield and Various Meteorological elements for Potatoes.
(------- temperature, ——— precipitation, ——— duration of sunshine)

Graph 8. Correlation Between Harvest Yield and Various Meteorological Elements for Sugar Beets.
(------- temperature, ——— precipitation, ——— duration of sunshine)

Graph 9. Correlation Between Harvest Yield and Various Meteorological Elements for Oats.
(------- temperature, ——— precipitation, ——— duration of sunshine)

In addition, it appeared necessary to conduct such analyses, in which the R diagram of each plant could be compared temporarily on the basis of each meteorological factor examined during our investigations. By means of this method we might learn whether during a specific period simultaneously with the positive requirements of one plant other plans show negative needs. This grouping might be considered to provide a basis for determining the necessary agrotechnics.

The following graphs show groupsings based on temperature (Graph 10), sunshine (Graph 11) and precipitation (Graph 12):

Graph 10. Correlation between harvest Yield and Temperature for Various Agricultural Products.
(——— wheat, ------ rye, ... maize, -.-.-. potatoes, ——— sugar beets, -...-... oats).

Graph 11. Correlation Between Harvest Yield and Duration of Sunshine for Various Agricultural Products.
(——— wheat, ------ rye, ... maize, -.-.-. potatoes, ——— sugar beets, -...-... oats).

Graph 12. Correlation Between Harvest Yield and Precipitation for Various Agricultural Products.
(——— wheat, ------ rye, ... maize, -.-.-. potatoes, ——— sugar beets, -...-... oats).

Results of the calculations demonstrated here might be applied in every day life successfully.

Their usefulness is most obvious in connection with harvest yield estimates, regional cultivation, regional agrotechnics, plant cultivation and in determining production levels.

Harvest Yield Estimate

Since calculations pointed to specific connections, particularly in the case of wheat, it is not unrealistic to attempt estimating harvest yields with the help of this method. Following a thorough elaboration of the method concerning wheat, we made a tentative estimate of the harvest yield for the year 1955. In possession of data relative to the last critical period on 13 June we estimated the national harvest yield average of wheat at 7.6 q with a 40 kg ± difference. At this time, the results appeared much too high. However, the weather conditions were unezpectedly favorable for plant development during the late spring, and thus, considering the error the harvest yield for this year was 0.6 - 1 q higher as our estimate. There has not been such an extraordinarily favorable spring weather since 1870. The lack of success in applying

the results to the year 1955, does not mean at all that our calculations are useless, on the contrary they are merely calling to our attention the importance of including phenological data in our calculations in the future. Such data were not available in the past, at least not to the extent it would have been necessary; in consequence they could not be considered in the present calculations.

Regional Cultivation

Each plant -- according to climatic and geographical conditions -- has certain claims on weather factors subject to changes, during the vegetation period. If these are known for a certain area, it is possible, with the help of detailed climatic data, to determine successfully which plant would thrive best in that area.

One of the most important objectives of agricultural promotion is solving the problem of regional cultivation. This is an unsolved problem today, both in production and in planning. As mentioned before, one of the basic principles of a successful solution to the problem of regional cultivation is to provide sufficient data on the nature requirements of the plants to be cultivated. Among nature requirements soil and weather conditions are most important. Since, in general, in case of given agrotechnics soil might be considered as constant from our point of view, the weather is the remaining changeable element determining regional cultivation.

On the basis of correlation calculations, we are acquainted with the time periods and meteorological factors determining primarily the shaping of harvest yields. As a result of multiple correlation calculations, we know the partial moment as well -- indicated as b in our discussions -- which helps us to determine with how many kilograms the harvest yield is altered by the changes of the meteorological elements here examined.

In case the weight of each meteorological factor on the shaping of harvest yield is known for the critical periods, it is possible, with the help of detailed calculations, to determine the probability for the expectation of a better or poorer harvest as an average for a certain area. If these calculations were completed, at least for regional units, it would be possible to determine in which area to expect a better harvest yield. More exact results might be obtained by marking these probability values on a soil map.

The procedure mentioned above, was applied in Pest County to three plants: wheat, maize, and rye. Probability values of meteorological elements were determined on the basis of the 31 years under investigation. It was established, on the basis of the data available, that the probability values of the meteorological elements for these 31 years, differed only slightly from the results of temperature observations in pentads during the past 100 years in Budapest.

As a first step, the probability values of the meteorological elements introduced in the multiple correlation calculations for the critical periods have to be determined. Since the different time periods do not participate to an equal degree in the shaping of harvest yields -- to obtain correct results -- the probability value must be multiplied by the different meteorological factors introduced in the calculations of the harvest yield weight estimates. Thus, the probability value of each meteorological factor is appearing according to its actual effect.

Here follow calculations relating to wheat, maize, and rye.

WHEAT*

Weather elements and time periods		Prefix of the Corre-lation	Weight of Harvest Yield Formation (%) c	Proba-bility Value Vm	CVm
N_1	26 November to 10 December	+	13.9	55	764.5
N_2	10 to 20 December	-	9.1	55	500.5
N_3	16 to 28 February	+	5.0	42	210.0
N_4	1 to 10 April	+	10.5	51	535.5
L_1	13 to 17 September	-	8.7	49	426.3
L_2	21 to 30 January	+	2.6	55	143.0
L_3	11 to 20 April	-	2.2	48	105.6
L_4	6 May to 4 June	-	14.7	51	749.7
C_1	1 to 10 April	-	3.8	45	171.0
C_2	1 to 10 April	-	6.5	55	357.5
C_3	16 to 31 May	+	2.7	45	121.5
			79.7		4085.1

* Legend for the tables: N indicates the duration of sunshine, L = temperature, c = precipitation, C = percentage of harvest development weight of each meteorological factor; Vm indicates the probability of the meteorological element concerned; C.Vm is the result of the last two factors.

The probability, that a wheat harvest yield exceeding the several year average yield of the district (7.3q per cadastral yoke) might be reached is expressed as follows:

$$V_t = \frac{4085.1}{79.7} = 51.3\%$$

MAIZE

Weather elements and Time Periods		Prefix of the Correlation	Weight of Harvest Yield Formation (%) c	Probability Value Vm	C.Vm
L_1	26 May to 9 June	-	15.9	65	1033.5
L_2	20 to 24 June	+	14.3	45	643.5
L_3	10 to 14 July	-	9.0	52	468.0
L_4	21 to 25 April	-	13.8	55	759.0
C_1	26 April to 15 May	+	2.8	48	134.4
C_2	26 May to 10 June	+	19.5	42	779.0
C_3	16 June to 15 July	+	8.7	41	356.7
N_1	26 May to 10 June	-	13.4	49	656.5
N_2	21 to 31 August	-	2.1	55	115.5
N_3	11 to 20 September	+	0.5	58	29.0
			100.0		4975.1

The probability that maize harvest would exceed the average obtained during several years in the district (9.0 q. per cadastral yoke) is as follows:

$$V_t = \frac{4975.1}{100} = 49.8\%$$

RYE

Weather Elements and Time Period		Prefix of the Corre-lation	Weight of Harvest Yield Formation (%) c	Proba-bility Value Vm	C.Vm
L_1	6 to 15 January	+	8.3	45	373.5
L_2	26 January to 4 February	+	5.3	58	307.4
L_3	26 May to 4 June	-	25.2	49	1234.8
C_1	11 to 20 September	+	1.6	45	72.0
C_2	16 to 25 December	+	2.0	35	70.0
C_3	1 to 10 April	-	0.8	55	44.0
C_4	16 to 31 May	+	0.9	45	40.5
N_1	11 to 31 December	-	15.5	46	713.0
N_2	16 to 25 March	+	3.9	48	187.2
N_3	1 to 10 April	+	8.3	51	423.3
N_4	21 May to 5 June	-	15.0	45	675.0
N_5	11 June to 20 June	+	13.0	51	673.9
			100.0		4813.9

The probability that rye harvest would exceed the value of averages obtained during several years in district (5.8q per castral yoke) is as follows:

$$V_t = \frac{4813.9}{100} = 48.14\%$$

For many years national harvest yield averages were higher than average yields in Pest County for all three plants. It is important therefore to determine, for the purpose of successful cultivation, what is the probability of reaching in Pest County harvest yield results equalling or exceeding the national harvest yield average. The partial moment (b) mentioned before will serve this purpose. With the help of the method here described, we considered every deviation of meteorological elements from the average value even if not exceeding one or two tenths. Thus, on the basis of partial moments, it is possible to determine the quantity

of meteorological elements which are already more substantially influencing harvest yield averages. For wheat the following deviations were considered only: temperature more than 1° Celsius, duration of sunshine more than 10 hours, precipitation more than 5 mm. Now if we are adding the values of b, we might determine the lower border of harvest yield average, the probable occurrence of which is the object of our investigations.

The use of this method requires the assumption that all factors are changing identically and that the additional larger amount of any meteorological factor appearing during a critical period is not compensating for the eventual deficiency of another meteorological factor during a previous period. Elimination of this error will not be possible until exhaustive biological investigations are completed.

On the basis of these calculations, the probability is 30% that the harvest yield average of wheat in Pest County would exceed the normal 8.3 q per cadastral yoke; in the case of maize the probability is 38.8% for a yield exceeding 9.9 q per cadastral yoke; in the case of rye 37% for a higher value than 6.4 q per cadastral yoke.

Regional Agrotechnics, Plant Cultivation

The above results should be followed up by plans for regional agrotechnics and promotion of plant cultivation. In Hungary, regional cultivation might be mentioned in connection with some plants only (onions, tobacco, paprika, etc.). The plants, of which harvest yields were examined by means of multiple correlation calculations, are among those triving in the whole country. It is evident from the calculations, that weather is the most important factor in the case of all three plants. Weather conditions include several elements which have different effects during the different phase of plant development. It occurs only in most isolated cases that weather elements develop and follow each other in such manner during the entire plant development as to result in an optimum harvest yield. We are always finding periods, during which the plant -- in the majority of cases -- does not obtain the specific quantity, which is best for its development.

Information on these elements and periods might be very useful to the plant breeder, since they are indicating the direction in which to develop plant cultivation in a particular area of the regional unit, in order to obtain the largest harvest yield possible. In addition to plant cultivation, information on the above described effects will permit the development of agrotechnical methods providing effective help for successful cultivation, such as development of agrotechnics for each regional unit.

Raising of Production Levels

With the inclusion of the more important agrotechnical factors in the calculations it is possible to determine the extent of their influence on the shaping of harvest yields. Besides organic and artificial fertilizers, other important agrotechnical factors might be considered in the the calculations. The most important are plant rotation and selection of the most favorable type. It is possible, for example to determine the right crop rotation in the territory we investigated. If we know this system, we are in a position to substitute many other values and to determine the influence of crop-rotation upon the shaping of harvest yield by means of the correlation calculations. Thus, for example, the best crop rotation is numbered 10, the worst 1 while the others are arranged between these two values.

In consequence the calculations might be applied to economic objectives.

CONCLUSIONS

The above discussed results allow us to draw the conclusion that the multiple correlation calculation might be applied, in the widest sense, to agrometeorological research. These results offer, in addition to solving primary agrometeorological problems, further possibilities which might be applied with success in various other investigations.

It is recommended to complete these observations at least for regional units for the purpose of obtaining a complete picture of the whole country. It seems necessary to include the various agrotechnical factors in the calculations, for the hoe plants in the first place (at least for the most recent periods). The calculation might be made more exact by means of elaborating in detail the evaluation of corrections.

5605

Hungary CSO: 4714

CURRENT PROBLEMS OF THE TSZ MOVEMENT

/Following is a translation of an article by Bela Toth in the Hungarian-language periodical Magyar Tudomany (Hungarian Science), Budapest, Vol. LXVII, No. 5-6, May-June 1960, pages 365-371./

At the general assembly of the Academy a session was held on the main business organization problems of the producer cooperatives, at which session Candidate of Agricultural Sciences Laszlo Stenczinger presented the debate-opening report.

By way of introduction the speaker stated that both in the new and in the older producer cooperatives consolidation of communal farming depends to a great extent upon business organization. Therefore, during this period the problems of business organization regularly come to the fore, and their proper solution becomes a crucial factor of the development of communal farming.

In the organization of communal farming and in building up production the necessary demands of industrial development must be taken into account in proportion to the degree of development and characteristics of the cooperative.

The starting point of communal farming in the new producer cooperatives is communal plant cultivation, which appears as an immediate task, and also is the factor which may be begun immediately on a large-scale farming level.

Building up animal husbandry necessarily must follow the organization of communal plant cultivation.

According to biological and fodder characteristics, the communal swine stock may be developed most rapidly. This derives from the fact that the swine may be propagated rapidly because the first year's fodder production ensures the necessary fodder. The construction demand is very modest and the buildings may be erected through the construction means of the producer cooperatives themselves.

At present the organization of communal poultry production appears very similarly to the organization of swine production, and in many respects is an easier problem than the latter. The hatching stations are able to provide suitable stock, and the fodder plants are able to supply poultry feed to the producer cooperatives. The building demands of this type of production also may be easily met.

The establishment of cattle production is of special importance in the entire business organization of the cooperatives. This will require the realization of well-founded, plan-conforming business organization and animal husbandry work, to ensure the development within a few years of livestock of number and type best suitable to the characteristics of the producer cooperatives.

Accompanying plant development is the problem of the most efficient selection, scheduling and realization of the producer cooperative investments. In accord with the national interest the industrial interests of the producer cooperatives demand that they rely primarily upon their own resources and means in their investments, and that they find temporary solutions appropriate to the transitional situation. This applies primarily to farm construction. The advantages, efficiency and economic nature of construction based on internal resources are obvious to the majority of the cooperatives.

The producer cooperatives receive considerable assistance from the machine stations in the mechanization of production. In addition, however, the producer cooperatives have the possibility for resolution of their mechanization through their own resources.

Determination of the production structure, and of the direction of production of communal farming are of exceptional importance in the organization of producer cooperative farming and building up production. This problem, however, has peculiar differences with respect to the new, and the older producer cooperatives.

In general, the producer cooperatives which are organizing communal farming at this point are unable to, and the production of entire villages cannot convert to a strictly defined direction of production from one year to the next. Therefore, the interests of both the state and of the new cooperatives fortunately coincide in the principle that villages converting to cooperative farming shall continue to produce the same products as before, in greater quantities if possible, but essentially in the same, or similar composition as prior to socialization. To the extent that the cooperative villages comply with this principle they will be able to maintain or improve their previous economic level, and at the same time they will contribute to satisfaction of the needs of the country in an adequate way and degree.

The necessity for specialization in the old, established and consolidated producer cooperatives presents itself in a more definite form. In these older producer cooperatives the main problem is not transition, but permanent industrial organization. Specialization of production and the formation of a production structure and farming system which will enable maximum exploitation of our resources are inexcapable in the interest of the development of communal farming. This means that they must analyze their natural and economic possibilities, the production traditions of their regions, the experience of their members and the demands of profitableness, and in conformance with this select several crops and branches of animal husbandry for development into efficient, large-scale production industrial branches.

Good organization of communal farming depends to a great extent upon the formation of the industrial structure of the producer cooperative economy.

The industrial structure includes the plant breakdown of communal production, the organizational structure of the direction of production and organization of work of the members. These three branches of plant structure are very closely interrelated.

The plant breakdown of production may be organized according to permanent brigades based on the main branches of production (plant cultivation, animal husbandry, etc.), combined industrial organizational units, or complex brigades, or combined production area units, or plant units. The organization of complex brigades is recommended especially for the older, consolidated producer cooperatives, and the formation of plant units is recommended for producer cooperatives with very large areas.

One of the most important problems of communal farming is the determination of the proper method of profit distribution, or the just distribution of the common income among the producer cooperative members according to socialist principles.

Increasing the ratio of cash profit sharing within the work unit value system may be considered a generally applicable guiding directive. The first, and most generally applicable step in further development is the regular cash advance payment.

Through regular advance payments and through the formation of an income reserve the basis for guaranteed profit sharing may be increasingly ensured, which is the presently developing main road to cooperative profit sharing.

In the discussion and debate following the report Corresponding Member of the Academy of Sciences Vilmos Westsik urged that farms presently operating on sandy, and other extreme soils employ agronomists having specialized expert knowledge in the interest of resolution of the organizational problems of the plants, and that these cooperatives take measures to provide for the training of such experts.

Assistant Director Istvan Palinkas spoke on the importance of professional accounting and filing systems of the producer cooperatives, and recommended review of the certificate system and its appropriate further development in conformance with the demands of double bookkeeping.

During the session Candidate of Economics Gyula Lorincz and producer cooperative president Pal Kiss also offered comments, and Academician Ferenc Erdei presented a co-report. In his co-report Erdei took exception to the standpoint of Laszlo Stenczinger on the subject of leadership, direction and organization of the cooperative as constituting the main producer cooperative problem. In the view of Erdei the basic problem is that of ensuring the material interest of the members. Academician Erdei also discussed the relationships between specialization and plant structure, discussed the possible long-range solutions of the relations between various industrial, economic and regional conditions from a theoretical point of view. With respect to the present situation

he established that he "concurs in the idea that the generally accepted principle that for the time being the earlier direction of production must be maintained in the producer cooperative communities, even though this direction of production may be very diverse, to be the only proper principle. Within the producer cooperatives, however, it is already proper to tend toward intra-plant specialization."

Producer cooperative agriculturist Janos Erdelyi reported that great care is devoted within his producer cooperative to the household-farm maintenance of swine by the cooperative members, and the members are supplied with registered sows. The offspring of these sows are purchased by the cooperative for fattening and other purposes. Scientific associate Mrs. Janosne Laszlo spoke on the importance of animal husbandry at the household farm level from the point of view of fulfillment of goods plans.

Scientific associate Tibor Toth spoke on circulating funds. He emphasized the advantage of ensuring circulating funds to a greater degree through cooperative resources. The basic method for achieving this is to couple industrial branches in a manner which will ensure continuity of operational revenue during the course of the entire year. He demonstrated a practical method for computation of amount of expendable means necessary for operations. With respect to the ratio between fixed and circulating capital he presented data proving the contention that operational revenue is greatest if this ratio is 1 : 1, or greater.

Candidate of Agricultural Sciences Lajos Szemes stated that the results of industrial organization research are not carried over into practice to an adequate degree, despite certain positive results in this respect, because there are not enough industrial organization experts in the administrative network, nor in the individual plants. The possibilities provided by the government have not been utilized with adequate consideration and thoroughness. He recommended that the advanced training of industrial organization experts be established, and that unified direction of industrial organization be established within the state organs. He urged that an investigation be conducted which within the next few months would summarize and allocate the tasks of industrial organization. Finally, he recommended that status and professional training of the industrial organizers assigned to the megye and jaras administrative apparatus be reviewed.

Candidate of Agricultural Sciences Istvan Vagsellyei spoke on the problem of the industrial branches. He emphasized that the ratio between the industrial branches is basically determined by the needs of the public economy. Within this problem the starting point is plant cultivation, because this in turn is determined by the soil as the main means of production. Animal

hsbandry may be built upon this industrial branch. He pointed out the danger latent within the production of excessively diverse crops. The proper solution, he stated, would be to produce no more than three or four different crops, and these three or four crops should be selected according to the following points of view: The first consideration should be the crops which are best suited to the natural characteristics and plant installations. Secondly, the crop for which the most advantageous contracts may be concluded must be determined, because the contracts also document the demands of the public economy. Thirdly, it must be taken into consideration how the production of the crops requiring the greatest amount of work may be reconciled with the production of other grain and fodder crops and with the manpower situation and the exploitation of equipment. With respect to animal husbandry the over-all situation always must be examined to ensure that the conditions of continuous production should be ensured and to ensure that the goods production plan will be fulfilled. The most suitable form of production branches and ratios always must be sought within these factors.

Bela Sas spoke on the problems of the large-area producer cooperative villages of the Transtisza region. He explained that because of the formation of many producer coopeeatives in these villages it is necessary that many producer cooperatives jointly operate auxiliary plants (grinding mill, stills, etc.). His opinion with respect to the double-farm personnel is that because of the manpower shortage of the producer cooperatives exploitation of the double-farm personnel is necessary. He called attention to the fact that there is too much manpower in the sandy soil regions, with resultant reduced income, and thus provisions must be made in this respect for planting more intense and profitable crops, such as vineyards, orchards, etc. His opinion on the household farm problem is that the magnitude may be variable, but must be organized in a manner to further the communal development.

In his address, producer cooperative president Ferenc Varga established with satisfaction that the development, according to which the Academy is dealing with the current problems of the reorganization and development of agriculture in a scientific manner indicates the possibility of a real unity of theory and practice. He also mentioned that along with the socialist reorganization of agriculture the elevation of the cultural level of the rural population also must be taken under consideration. He considered the distribution of plowland among families to be a transitional and emergency solution. With respect to the organization of work in viticulture the organization of complex brigades was found to be efficient in his cooperative, including the work detachment as the main organizational unit. The areas also are divided according to these work detachments.

With respect to profit sharing, the main focus at his cooperative is the distribution of cash profits, and except for form, this is considered to be a realization of the material involvement of the personnel. He recommended that the Academy publish a popular book series intended to assist the producer cooperative leadership. In addition, he considers it necessary that the intelligentsia offer concrete assistance to the producer cooperatives, as is done by the labor class. He considers it essential that industrial settlement be coordinated with the employment of the rural population, thus ensuring year-round, regular work for the young and old. The speaker disagreed with the issuance of permits for goods production deriving from household-farm livestock. He urged that more experts be included in the plants and in the jaras agricultural organs, and that administrative costs of the directing organs be reduced in the producer cooperatives. He sated that in his cooperative socialist work groups are formed from members who do exemplary work and who constantly are improving their training. He criticized the fact that branch banks often are unnecessarily strict in their interpretation of the financial statutes.

In his reply Laszlo Stenczinger suggested that resolution of the problem of industrial professional advice be placed on the agenda. Replying to the comments of Academician Erdei, he again stated that although he considers realization of the principle of material involvement to be important, nevertheless it differs from the problem of profit sharing, and the crucial factor in respect to the latter is the degree to which the leadership creates the prerequisites for a high revenue. With respect to the organization of fodder management he emphasized that it is essential that a farm have a reserve during every period of the year. With respect to animal husbandry he recommended that if producer cooperatives which have increased greatly in size were unable to increase their livestock in proportion to their increase in area, they should effect a change in the structure of crop production in the interest of increasing goods production, and thus maintaining the level of income. He also considers the distribution of lands among families to be a transitional solution, which may be utilized according to the decision of the members. He was in agreement with the statements and recommendations of the other speakers.

The closing address was presented by Academician Ferenc Erdei. He stated that the problems of an entirely new phase of the cooperative movement were raised during the debate session. He established that the process of industrial organization must begin from the point of view of crop cultivation, and emphasized that animal husbandry is of great importance from the point of view of the profitableness of the entire operation. He stated that he was in agreement with the remaining comments, and summarized the recommendations which had been put forward.

1. The results of regional research must be realized with respect to exploitation of local characteristics in the operational plans, and the method for this utilization must be found.

2. A uniform cost accounting and operational calculation method should be introduced in the producer cooperatives.

3. The regulations pertaining to the inventory and account balance should be improved with respect to the administrative level.

4. Uniform and high quality industrial organization work must be ensured in agricultural administration, especially at the jaras level and in the plants.

5. A uniform research plan must be developed in industrial organization science.

6. Cooperation between producer cooperative plants must be resolved with respect to goods, manpower and auxiliary plants.

7. Greater attention must be devoted to the culture of rural areas and to the world-outlook education of the peasantry.

8. It is desirable to extend industrial development to rural areas to a greater degree.

In closing he stated: "I am especially grateful to Comrade Varga for his noticeably heartfelt, and I must admit, welcome statement that he is pleased to see and feel that the Academy, which once had been a self-isolated tower of science, now is entering into problems of daily life, and especially into the most difficult daily problems of agriculture. This was begun with very serious resolve, is continuing with equal resolution, and on Thursday we shall propose serious recommendations before the general assembly to the effect that the Academy should not come to a halt on this road, but looking to the future, should fulfill the obligation of science through the resolution of the problems which are of greatest importance with respect to the future, accomplishing this also through extending its greatest possible aid in the resolution of the most difficult problems of the present."

On the second day Doctor of Biology Andras Magyari, vice minister of agriculture, presented his address, entitled "Increasing Meat Production in the Socialist Large-Scale Plants."

In his introduction he indicated that increasing meat production is directly interrelated with satisfaction of the meat consumption demand of the population, and therefore is an inexcapable task. The basic prerequisite for the possiblity of effecting this increase is ensured in the public economy because more than 70% of the agricultural plants belong to the socialist sector. He summarized the other conditions ensuring an increase in meat production in the following:

1. Material involvement of the producers in the development of meat production.

2. A solid fodder basis.

3. Good condition of the breeding stock of magnitude established in the public economy plan. Intensive exploitation of

the breeding livestock in the state farms, in the common and household farms of producer cooperatives and last, but not least, by the still independent farmers.

4. Ensuring the buildings necessary for the creation of a burgeoning communal animal husbandry and high quality meat production in the producer cooperatives.

5. Further improvement of veterinary medicine.

6. Extensive utilization of the achievements of science and technology in the state farms and in the producer cooperatives.

Speaking in greater detail of material incentives, he stated that although the present provisions generally provide material incentive, because meat production must be increased further, additional incentives also must be found.

In connection with the creation of a fodder reserve he analyzed the methods by which a solid fodder reserve may be ensured. In this connection he indicated primarily the possible increase in the planting area and yield of corn, and the production of a greater proportion of silo corn. He emphasized a further increase in ratio of the alfalfa planting area. He recommended that after good pastures are plowed for the first time they should be exploited through the planting of corn. In connection with ensuring a fodder reserve he spoke of the importance of constant emphasis of the continuity of fodder supply in the interest of more complete exploitation of the production capacity of livestock. In addition to production of an ample fodder reserve greater attention must be devoted to supplying the protein demand. This will require primarily increasing the planting area and average yield of papilionaceous fodder crops, alfalfa, red clover, soya and peas. He spoke of the need for loss-free harvesting of the fodder crops and their economic consumption, and recommended more intense investigation and use of the rack- and air-circulation drying method. In the interest of increasing the fodder reserve he recommended greater use for fodder purposes of carbamide, various antibiotics, vitamines, synthetic hormones and other biological preparations, and of manufactured combined fodders.

In his address he listed the measures necessary for increasing meat production according to the various animals. In hog raising he emphasized the farrowing of sows twice yearly and raising pigs without loss, farrowing the fattening sows once, and increasing the number of sows. An important task in fattening is acceleration of the fattening turnover. He called upon researchers to assist in the development of the best methods for attainment of the goals. He emphasized that the best results thus far have been obtained in cattle raising, although the number and increase of cows must be further increased and calf deaths must be prevented. The least possible fodder consumption must be taken as the goal in cattle fattening. In the interest of reduction of fattening costs a greater proportion of the lean-to type of buildings must

be built. This alone would make cattle fattening one-third cheaper than before. In the field of poultry farming there has been progress in overcoming diseases, but poultry raising is still on a low level in the large-scale farms. Here, too, the primary objective is the attainment of an increase in protein fodder, although more combined fodders also must be produced. More combinations must be produced for the purspoe of raising hybrid chickens. He emphasized the importance of raising roasting ducks and geese. In the field of fish farming he recommended the establishment of additional fish lakes in agriculturally unfavorable areas and on despoiled rice fields. He indicated an increase in wool production as the main task in sheep farming.

In closing, he emphasized the necessity of more extensive practical utilization of scientific achievements. The achievements of science and technology which may be applied in the field of animal husbandry, and the good production experiences of leading workers must be introduced more rapidly and quickly disseminated. The new zootechnical and feeding procedures, through the use of which meat production, and especially meat commodities production, may be further increased and the production costs reduced, must be developed in a form suitable for practice and placed at the disposal of the state farms and the producer cooperatives. In the interest of increasing productivity great attention must be devoted to the mechanization of certain work processes which require a great amount of manual labor.

The export aspects must be studied continuously, so that the necessary quantities of goods suitable for export may be placed at the disposal of foreign trade at the proper time.

Agricultural workers must devote constant attention to increasing their professional training. Without this they cannot exploit the great possibilities latent in the socialist large-scale farms for the increasing of yields, reduction of production costs and improvement of the productivity of labor. Increasing their professional training enables successful utilization of the achievements of science and technology for the good of agricultural production.

In the first co-report Doctor of Agricultural Sciences Harald Tangle spoke on the utilization of biostimulants in meat production. In a co-report entitled "The Importance of Farm Mass Fodders in Beef Production", scientific department head Geza Bocsor emphasized that the present cattle fattening method is too costly because too much fodder is consumed per kilogram of beef produced. Through experimmnts conducted at the Animal Husbandry Research Institute he proved that cattle of various ages and sex may be successfully fattened while reducing fodder dosage, through feeding greater proportions of farm mass fodders. Green fodder and silage prepared from green fodder are primarily suitable for cattle fattening.

Candidate of Agricultural Sciences Ferenc Kertesz spoke on the protein demand of fattening swine. He emphasized that it is not sufficient simply to produce the necessary amount of protein, but its economic realization also must be furthered. This is possible through fattening porkers, and through providing the livestock with adequate amounts of protein when they are in the meat-producing stage. Within these two factors the biological value of the proteins, the protein concentration of the fodder, and the tastiness of the protein fodder also have a crucial influence upon the success of the fattening process. He cited several experiments in support of this statement. From the point of view of biological value the feeding of milk proteins as a supplement to grain seed may be considered more advantageous. In this manner approximately 30% fodder may be conserved.

Scientific department head Viktor Kurulecz recommended that in the interest of reduction of the nutrient loss of hay making the swath gatherers should be used in the hours before noon and after noon, and the silage of green papilionaceae should be employed. In the interest of the organization of regular protein supply he urged that greater proportions of soya and other oily seed be supplied to young animals. He also spoke of the need for increasing the manufacture of feed mixtures, and of the creation of a plant at which the manufactured products may be regularly tested. He indicated the possibility of the inclusion in the feed of protein sources not deriving from the plowland area, such as dried, inactive yeast.

Scientific associate Jozsef Czako spoke on the weight-increasing effect of biological agents (estrogen and antibiotics). He emphasized that the use of these domestic materials is advantageous from an economic viewpoint also. In cattle fattening, for example, a weight increase of 20 or 22 kg per animal may be obtained through feeding estrogen preparations, yielding a profit of 15 or 16 kg live weight surplus after the cost of manufacture and feeding the preparation is deducted from the total weight increase. He stated that last year 259 quintals of antibiotic preparations and more than one-and-one-half million syntestrine tables were consumed on Hungary's large-scale farms. The use of these products may and should be increased.

In the following, institute head Karoly Rimler spoke on the new trends in poultry farming, and scientific associate Tibor Mihalka spoke on the interrelationship between the number and meat production of Hungarian combed merino sheep.

Candidate of Veterinary Medicine Istvan Meszaros presented a report, entitled "Possibilities of Improving Increase in the Agricultural Large-scale Plant." He mentioned that the most urgent task is to improve the cattle increase. In 1960 a national average increase of 75 must be obtained per 100 cows. This will require primarily a reduction in the interval between

calvings. An interval of 13 months is suitable for the normal functioning of the sexual organs. Therefore the cows must be covered during the first or second rutting period, and the veterinarians must closely follow the covering rate. The second task is the therapeutic treatment of sterility. The speaker discussed detailed therapeutic procedures for correction of this condition. Thirdly, a task confronts the breeders, because the basic prerequisite for uninterrupted functioning of the sexual organs is the creation of favorable external circumstances: adequate feeding, care, etc. The latter is especially true with respect to sheep, because they are very sensitive to fodder from the point of view of reproduction. Therefore it is important to prepare sheep for pregnancy through the fodder. Walking swine, and ensuring their healthy care reduce the possiblity of sterility.

Scientific department assistant head Miklos Ribianszky reported on the utilization of alkali soils for fish hatcheries.

In his summary, Andras Magyari emphasized that it would be very useful if researchers would demonstrate the possible utilization of their research results at the plants. He also called upon the researchers to be bolder in their experimentation and to seek new solutions.

The reports were ended with the closing address of Academician Jozsef Schandl. He suggested that in the future the researchers investigate methods for more favorable formation of meat color, liquid content and structure.

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STATUS AND PROGRESS OF TECHNOLOGY IN HUNGARY

/Following is a translation of selected articles from the Hungarian-language technical newspaper Muszaki Elet (Technical Life), Vol. XV, No. 20, Budapest, 29 September 1960. Page and author, if any, are given under individual article headings./

A. THE MINISTRY OF METALLURGY AND MACHINE INDUSTRY PROMOTES THE USE OF SYNTHETIC MATERIALS IN THE MACHINE INDUSTRY

Page 2 By "E. K."

The production and consumption by the machine industry of various parts made of synthetic materials recently has begun to expand and increase. The individual plants, however, had to overcome many unexpected hindrances, material and capacity shortages and technical problems in the course of realization of their plans. As a result of dispersed production the use of synthetic parts was not as economical as had been desired. The Ministry of Metallurgy and Machine Industry took many measures for the resolution of these problems, the most important of which have been described in the following for the readers of Muszaki Elet /Technical Life/ by Chief Engineer Rezso Kiss, an associate of the technological department of the Ministry of Metallurgy and Machine Industry.

For the purpose of furthering economic and efficient utilization of synthetic parts the leadership of the Ministry of Metallurgy and Machine Industry created an Advisory Service within the framework of the Cable and Synthetic Materials Plant. The advisory service is at the disposal of all machine industry enterprises, giving advice on the use of synthetics, and on the basis of on-the-spot investigations offers information and makes recommendations for the solution of the enterprises' problems. The task of the service is to direct the attention of all concerned to possible uses of synthetics through propaganda along the proper lines, through sonsultation, special inquiry meetings, and through the organization of exhibits. The six-member group is composed of chemists, mechanical engineers and economists, and thus is able to examine from every aspect the problems which arise. The group also assists the Ministry of Metallurgy and Machine Industry in the development of its developmental plans for the consumption and

processing of synthetic materials. The group assists in respect to the consumption possibilities of synthetic materials through advising the design departments on modification of the design of parts previously made of metal to conform to the properties of the synthetic materials.

The Ministry of Metallurgy and Machine Industry considered its most important task to be the concentration of its previously dispersed production. The ministry indicated those enterprises which on the basis of results to date and the degree to which their production capacity has been built up are suitable for the production of certain synthetic products for other enterprises. It was necessary to designate several enterprises to ensure continuity and a rapid increase in production, and to ensure utilization of all production experience previously obtained. The Cable and Synthetic Materials Plant is unable to completely satisfy the rapidly increasing demand alone, even with the aid of the planned investments.

The profile of production is intended to be utilized for typification and for the purpose of the formation of large series production. The various machine- and vehicle part demands are accumulated (for example, the demand for parts of approximately the same function and size in the vehicle- and shipbuilding industry) and attempts are made to effect industrial branch typification and standardization. This enables combination of the various small series, and also enables more economical recovery of the considerable tooling-up costs of the synthetic material parts.

Under the five-year-plan production capacity will be increased not only in the Cable and Synthetic Materials Plant, but the machine supply of the other designated enterprises also will be ensured according to the development need of their production profiles.

The designation of these enterprises does not mean that the other enterprises will be unable to make synthetic parts for their own use in the future, but that this possibility will be confined to narrower limits. Thus every enterprise may manufacture for its own use parts weighing less than 50 grams each, made of thermoplastic injection-molded plastics. Every enterprise will be able to further process the semi-finished synthetic products purchased (tubing, rods, etc.) through vacuum shaping or by other methods. The non-designated enterprises also may process polyester resins reinforced with glass or other fibers, provided they do not intend to produce shaped pieces from these materials.

Only the designated enterprises may manufacture thermosetting plastic items, thermoplastic products weighing more than 50 grams, semi-finished products (tubing, etc.), and shaped pieces made of glass fiber-reinforced polyester resin.

Profiling

Profiling refers primarily to the internal demand of the Ministry of Metallurgy and Machine Industry, and only the inter-bureau profiling subcommittee organized under the National Plan Bureau will decide in other, more complex problems of inter-bureau profiling.

Through the measures described it is intended to increase the utilizable amount of synthetic materials to three-fold greater than the 1959 amount by 1965. The actually anticipated demand for the individual synthetic products was determined partly on the basis of market research activity of the advisory service, and partly through summation at the level of the Ministry of Metallurgy and Machine Industry of the enterprise synthetic materials consumption goals built into the five-year technological plans.

In addition to the planned and executed large-scale measures, many "smaller" problems also await solution. For example, development is being hindered at present by the fact that adequate raw materials cannot be provided in amounts sufficient for exploitation of the existing thermoplastic capacity of the Cable and Synthetic Materials Plant, although the demand considerably exceeds production. It occasionally happens at other enterprises, also, that failure of scheduled delivery of raw materials endangers further exploitation of the results achieved to date, and blocks the inclination toward experimentation.

In certain cases the various quality debates have a disturbing effect on development. Foreign experiences show that different qualitative demands must be placed on synthetic products than on those of the classical materials. The manufacturers consider the excessive "esthetic" demands which have arisen at the delivery acceptance stage for the synthetic housing of telephones, or for the synthetic chassis of toy automobiles, which demands in many cases require a two- to three-fold increase in work demand of the cheap plastic item. The experts also consider improper the demands of certain enterprises for tolerances in the range of one-hundredth millimeter, when the tolerance specifications for the same items abroad are in the range of one millimeter.

More rapid knowledge of foreign experiences and the development of domestic practice will further the resolution of many misunderstandings. It is fortunate that a Hungarian delegation will be able to become acquainted with the experiences of foreign synthetics processing technology and to view the synthetics exhibition at the international Synthetic Materials Industry Congress which is to open soon at Amsterdam. The Ministry of Metallurgy and Machine Industry is planning several foreign experience exchanges during the coming year, also, for the benefit of domestic experts.

The Ministry of Metallurgy and Machine Industry also desires to increase the revelation of domestic experience. At one such experience-exchange special meeting to be held in the near future, for example, it is intended to demonstrate to experts of the vehicle- and shipbuilding industry the synthetic material entrance doors developed by the Vehicle Development Institute and tested in actual use on Budapest buses.

Chief Engineer Rezso Kiss concluded his report with the statement that the Ministry of Metallurgy and Machine Industry is striving to further the economic and efficient use of synthetic materials in the field of the machine industry through wide-range plans and measures.

B. ECONOMIC BRIEF: DEVELOPMENT OF THE INDUSTRIAL BRANCH

Page 2 Unsigned Article

During the past years the fine ceramics industry increased primarily through maximum exploitation of existing facilities. There are no longer great possibilities for further development in this field. Because of this, experts of the industrial branch recommended that a new fine ceramics plant be built toward the end of the second five-year-plan or at the beginning of the third five-year-plan, which would ensure the manufacture of several important items and would enable clarification of the production profiles. At present every fine ceramics plant has a mixed profile, and this undeniably causes many complications. Although at present the clarification of these profiles appears unresolvable, but the commencement of operation of one or two new plants could resolve the situation, to say nothing of the fact that the new plants also are needed from the point of view of the public economy.

C. ELECTROLYTIC-PLASTIC TOOL MAKING

By Gyorgy Sarbo

As is well known, the most expensive work phase and the phase which requires the greatest amount of work in preparation for the manufacture of various synthetic material mass-produced items is the tool-making phase. Thus at many sites attempts are being made to replace the presently prevalent machining of tools with some kind of rapid tool-making process. When we recently visited the Cable and Synthetic Materials Plant and spoke with Chief Engineer Dr. Karoly Schwaner and Chief Designer Istvan Radnoti we asked, among others, about the status of this situation in Hungary. They explained that in addition to the traditional machining of tools the cold imbedding method (pregnation) has been in use for a long time, in which a tempered steel core is imbedded in a softer pressed-steel tool and the product is again tempered. Tools produced by this "rapid process" are very suitable for pressing thermo setting synthetic powders (such as bakelite powder), because these powders are likely to damage the highly polished surface of the tools.

Beefing Up the Model Transfer With A Metal Spray

The products of the enterprise also include the so-called thermoplastic synthetic material items, which soften when heated. In this case the melted, viscous material is injected into the closed mold chamber of the tool. Although specific pressure in this case reaches 1,100 to 1,300 kg/cm^2, there is less danger of damage to the highly polished surfaces. This started the plant on the road to experimentation with a new rapid-tool-making technology, the electrolytic-plastic process, which is more advantageous from all aspects in the mass production of thermoplastic synthetic material items, as we shall see below. In this process a model is made (or an existing sample piece is used), consisting of any kind of material: metal, wood, plaster, glass, plastic, etc. The model is covered with a layer of graphite or silver nitrate to ensure an adequate degree of electric conductivity. The covered model then is placed in an electrolytic bath, where after approsimately 40 or 50 hours a 1 or 2 mm-thick copper crust is formed, giving a completely faithful transfer of the model. The transfer then is "beefed up" with a metal spray to provide a considerable steel mass covering it, which covering then is machined to the proper dimensions to enable it to fit into the tool frame. With this the insert already has been completed, whereas the "stamp" generally must be machined as a simple mold.

They illustrated the advantage of the electrolytic-plastic tool-making process with an example: 300 to 600 work hours are needed for making the mold portion of the sandwich plate tool for copying "crystal" glass in polystyrol by the machining method, depending on the size of the tool and the complexity of the machining cuts. A cold-imbedded tool cannot be taken into consideration in this case because of the prohibitively large surface. Furthermore, this method would not be efficient because machining of the cold-press stamp would be equally costly with respect to work hours needed. On the other hand, a transfer, and the entire tool for an existing glass crystal or other model may be made entirely of light material by the electrolytic-plastic process. The entire process requires 60 to 80 work hours. An additional advantage is that semi-skilled laborers may be used instead of skilled laborers in making the model transfer, and depending upon the size of the series, many tool inserts may be made quickly and easily. It must be mentioned, however, that although only 10,000 to 20,000 large, or 20,000 to 35,000 small pieces may be injected with the copper tool, the cold-pressed tool is suitable for the production of 200,000 to 300,000 plastic objects.

The main difficulty in experimental development of the new technology was posed by the metallic spray "beefing-up" procedure.

At first the finished copper transfers became deformed to a great degree, because the original model sample occasionally broke. Later, the copper crust separated from the steel block. These were caused in part by improper use of the metal spray, and in part by the different coefficients of expansion of the two metals. The problem finally was solved by cooling the transfer with compressed air from below during the metal spraying process.

Araldit Instead of Metal Spray

We learned further that although the electrolytic-plastic rapid tool making process was very successful in the Cable and Synthetic Materials Plant, because of difficulties connected with the metal spraying, the latter had to be done at another enterprise. Because of this a new method was developed experimentally for "beefing-up" the mold. The essence of this new procedure is that the copper transfer prepared electrolytically from the model first was placed in a wood frame, and then the entire mold was covered with epoxy resin (araldit). The first such tool already has been completed, and the test pressing of desert bowls using this three-layered tool has been found satisfactory in every aspect. During the course of control it was found also that the pressure hardness of araldit used in place of the steel also is completely adequate. The life expectancy of the tool made by the new method now is being tested, and the outlook in this respect is very reassuring.

D. RECOMMENDATIONS FOR THE POWER MACHINE INDUSTRY AND THE REFRIGERATING MACHINE INDUSTRY

Page 6 Unsigned Article

The general machine building technical department of the Machine Industry Scientific Society dealt with, among other things, the manufacture of power- and refrigerating machines. The present article describes this portion of their resolutions.

Power Machine Building

The technical department emphasizes first of all, that the ratio figures established in the five-year-plan properly support the desire of the industrial branch to have the organizations concerned decide where the individual fuels are to be burned most economically.

The plan recommendation quite properly allocates the greatest investment sums to the mechanization of technology. However, it would be necessary also, during the plan preparation, to review the functioning of organs created within the individual enterprises for the development of technology, and to realize measures through which certain outmoded technologies may be eliminated through utilization of the existing possibilities of the enterprises and through application of the professional level of these technologies.

The type-series of the industrial- and central heating boilers should be formulated in a manner so that they would be complete with respect to the auxiliary installations. Because of this, it is very important that measures be taken to ensure that the production output schedule will ensure lengthy test operation before the boilers begin their intended production operation. During this period the boilers may be modified in accordance with the behavior of the fuel, or in the interest of improvement of the circulation conditions established in the heating area. This operational testing period should be approximately three months, at the minimum, and a minimum of six months for large industrial boilers. It is absolutely necessary that both the planning and building levels of power machine building be subordinate to a superior directing organ, because good coordination is imaginable only in this way. Under the present circumstances the opposed interests which gain expression in many instances hinder technical development of the building branch.

In the field of power machine building, as generally is true in many other fields, research institutes are lacking. Although the appropriate academic chair of the Polytechnical University deals with the theoretical problems of research, industrial research is

completely lacking. In general, the building of power machines and their auxiliary installations demands the establishment of a central research institute in this field to perform industrial research connected with the development of the manufactured products.

Refrigeration Machine Building

The following recommendations were made in connection with building refrigeration machines:

A unified solution for the development of refrigeration machine building is necessary. In view of the fact that at present refrigeration machine building is dispersed throughout various parts of the country, development has remained with two enterprises of the General Machine Industry Administration, the 4 April Machine Building Plant, and the Refrigerator Machine Building Plant. The refrigeration machines should be classed as household, small refrigerators, medium refrigerators, and large industrial refrigerators. From the point of view of long-range planning and development the creation of a single, centralized planning section is necessary, which would work out in detail the refrigeration machine types already on the world market, or the parameters of these machines, organize these data in table form, compare the parameters with those of the refrigeration machines manufactured in Hungary, and on this basis would determine in advance the trends of technical development. From the point of view of production the question arises of the type of solution which should be realized during the coming period (second five-year-plan) with respect to the refrigerator plant sites. At present production is dispersed and is being conducted with inadequate direction, and the existing capacities do not satisfy the demand. It is necessary also to bring up the problem of the production of refrigeration trucks, because customers are calling for the shipment of refrigeration trucks along with our complete installations.

None of the people's democracy countries is manufacturing refrigeration trucks, and this theme interests Hungary all the more because we may ease the export of trucks by shipping completely assembled refrigeration trucks. Hungarian industry must prepare for the use of freon in refrigeration machines, despite the fact that freon is not produced domestically, because foreign demand makes this necessary.

E. ECONOMIC BRIEF: NEW HUNGARIAN PATENTS

Page 6 Unsigned Article

Mechanical engineer Dr. Laszlo Edelenyi, physicist Jozsef Hatvany and chief auditor Dr. Laszlo Lado recently obtained a patent for their invention, called "Program Control of Machine Tools Through Rapid-Action Magnetic Memory." The aim of the invention is to reduce the complexity of program-controlled machines, and to create a program-controlled machine the construction and operation of which is considerably cheaper than the current types. As is well known, the principle of operation of complete programming (Ferranti, Numericord) is the processing of technological specifications contained on punched tape or punched cards by an electronic digital computer. The computer produces analog impulse frequency-modulated signals. The signals are fixed on a multiple-channel magnetic tape, and the machine tool is controlled through playing back of the tape channels. This type of solution of the problem is complicated and very expensive. Because of this, most of the plants are seeking more inexpensive solutions, and are satisfied with control of the machine tools based directly upon technological controls perforated in the tape or card. The solution of the three inventors enables elimination of the complicating information-carrying media (magnetic tape, paper, etc.). In addition, they have freed their program control machine from complex electronic equipment. It would be difficult to describe this noteworthy invention in a few sentences. The machine is equipped with a rapid-acting magnetic memory. The control machine contains only elements for machining curves described by straight lines determined by function generators which are built in, in advance. The machine takes its program commands directly from the rapid-acting magnetic memory, passing them to the registers connected to the execution parts, to which points feedback digital signals from the execution parts also arrive.

F. THE HUNGARIAN PHARMACEUTICAL INDUSTRY TODAY

Page 7 By Jozsef Bognar

Hungary's pharmaceutical industry had achieved world recognition during the period between World War I and World War II. After nationalization its production increased many fold.

As is well known, the sum total of Hungary's drug production is produced by three Budapest plants (Kinoin, United Drug and Food Plant, and the Kobanya Drugs Plant). At present these plants are under reconstruction at their existing plant sites. Their developmental possibilities, however, are limited.

The very rapid development of Hungary's drug industry and the number of new drugs which have appeared during the past ten to fifteen years indicate that this industrial branch requires great activity and extraordinary coordination in the fields of science, technology and economics. In the past, and to all indications in the coming ten or fifteen years, also, the greatest intensity and coordination of these three fields may be ensured only at Budapest.

However, the properly planned, very rapid development and increased efficiency of the Hungarian pharmaceutical industry, based primarily on the Budapest drug plants, may be realized only through assignment of the intermediate production of drugs which already have been successfully produced andmay be considered stable from the point of view of consumption, to provincial intermediate plants in proportions increasingly approximating actual drug production. This measure would enable the liberation of considerable capacities of the Budapest drug plants for further development of the drug industry at Budapest with relatively small investment, because of the previous multi-stage syntheses only the packaging and marketing should be performed at the Budapest drug plants. The equipment and personnel liberated in this manner should be devoted to research on the production of new drugs, and according to the principles mentioned, it would be advantageous to assign the production of the new drugs which are to be introduced to the provincial plants, on the basis of the original technological and consumption results.

This would ensure almost constant economic and rapid exploitation of the scientific, technical and economic research results obtained at Budapest. The results of the past approximately five years prove that Hungary's provincial plants of an intermediate nature (such as the Medicolor Plant at Fuzfo, etc.) are able to manufacture the intermediary products of several of Hungary's important drugs (Chlorocid, PAS, Phenacetin, Rheopyrin, Lidocaine, Vitamin C, etc.) considerably more cheaply than the drug plants

(10 to 30 percent more cheaply), in excellent quality, and in accordance with the rapidly changing and generally increasing demands of the pharmaceutical industry.

The greater economy of the intermediary plants is due in part to the fact that technical and economic organization of the intermediate plants are different from those of the pharmaceutical industry plants, and in part to the combination of drug intermediary products with dye production. In fact, many drug intermediary products (paranitrochlorbenzol, metanilic acid, etc.) also are raw materials for dye manufacture (sulphohanyl deep blue BI, hanylamine blue B and RT, metanil yellow, etc.). Furthermore, because of these two great consumption areas these products also have excellent export possibilities. Cooperation with the dye industry is necessitated also by the fact that large quantities (several hundred tons) of by-products are produced during the course of manufacture of the intermediary products of several important drugs, the consumption of which may be expected only within the dye industry.

Farming-out production to Fuzfo also is indicated by the facts that nitric acid, ammonia, sodium hydroxide, and chlorine are available locally there, and hydrochloric acid, aluminum chloride, etc. are produced at that plant as by-products, all of which are important raw materials in intermediary production.

The large scale synthetic manufacture of drugs requires the realization of expensive basic investments (storage, mixing, regenerating and transportation facilities for nitric acid, sulphuric acid, fuming sulphuric acid, sodium hydroxide, chlorbenzol, alcohol, acetone, etc.), the bases for which are ensured at the Medicolor plant.

On the basis of the above viewpoints, and together with the directing authorities and experts of the pharmaceutical plants, we investigated the pharmaceutical-intermediary production possibilities of the Medicolor Chemical Products Plant (Fuzfo plant site). According to our investigations we found the following feasible:

(a) farming-out the further synthesis steps of the production of the intermediary products already in manufacture, approximating as much as possible the actual pharmaceutical production (phenacetin, PAS, chlorocid, rheopyrin, azophen, amidazophen, etc.);

(b) reconstruction in the intermediary industry of the present large quantity of drug production, which basically is performed by the Budapest pharamceutical plants, in increasingly vertical processes, based on thorough economic analysis, and in well organized and as modern as possible forms (barbiturate, and butazolidin malonic ester derivatives, salicylic acid, etc.).

In view of the above facts, Hungary's drug-intermediary production should be built up on a large-scale level, on the basis of the following principles:

(a) satisfaction of the realistically probable demands of the pharmaceutical industry, primarily through intermediate products, and through increasing approximation of actual pharmaceutical production;

(b) utilization of pharmaceutical industry intermediary production in excess of satisfaction of pharmaceutical industry demands in the production of dyes in quantities in excess of domestic demand;

(c) in the interest of increasingly economic production, Hungary's drug-intermediary production should be planned at a volume to satisfy the conservatively estimated, realistic intermediary demands of Hungary's pharmaceutical industry and dye production, plus the optimum expansion possibilities in the future of these industrial branches. At the beginning of reconstruction, and until optimal expansion is achieved, total production capacity is to be maintained, and the initially superfluous drug-intermediary production is to be exported until its more economical consumption is ensured in pharmaceutical and dye production.

The present author does not consider it advisable to undertake the production of dye-intermediary products without the assurance of a domestic pharmaceutical industry and dye industry consumption basis and exclusively for capitalist export, especially under the present situation, in which the most economical production of many drug-intermediary products which are in great demand domestically, has not yet been resolved.

The present author does consider absolutely essential the production of the domestic, and occasionally of export demands which may be produced from dyes which may be made from intermediary products produced domestically either for the pharmaceutical industry or for export.

In the foregoing the present author has indicated that for the most part, andon the basis of the above principles, and with the aupport of the directing authorities, we may take a certain degree of guidance for the organized, planned development of Hungary's drug-intermediary production. Unfortunately the material bases (investment funds) of our developmental possibilities are extraordinarily limited. Only part of the developmental possibilities outlined above will be ensured. Even these possibilities will be available only in a long, drawn-out period, although as was indicated in the beginning of the present article the pharmaceutical industry requires extraordinarily rapid action. Thus it would be advisable to accelerate the planned development of Hungary's drug-intermediary production and definitely to expand the prescribed amount of this development, because this would enable a rapid and significant increase in the production of the pharmaceutical industry, an increase in

its mobility and economical character, which have been of crucial importance to the present time, and would enable the future introduction of operational production of an increasing number of new drugs.

5200 - END -